Scientific Research Publishing

Open Journal of Internal Medicine, 2025, 15(3), 231-241
https://www.scirp.org/journal/ojim
ISSN Online: 2162-5980
ISSN Print: 2162-5972

Evaluation of Cardiovascular Risk Factors in Type 2 Diabetics: 214 Outpatients at the Marc Sankale Diabetes Center in Dakar

Michel Assane Ndour*, El Hadj Mouhamadou Moustapha Thioye, Mouhamed Dieng, Djiby Sow, Matar Ndiaye, Omar Boun Khatab Diouf, Fatou Kiné Gadji, Muriel Diembou, Nassour Hassan, Boundia Djiba, Demba Diédhiou, Anna Sarr, Maimouna Ndour Mbaye

Medical Clinic of Abass Ndao Hospital, Dakar, Senegal
Email: *michelassanendour@yahoo.fr

How to cite this paper: Ndour, M.A., Thioye, E.H.M.M., Dieng, M., Sow, D., Ndiaye, M., Diouf, O.B.K., Gadji, F.K., Diembou, M., Hassan, N., Djiba, B., Diédhiou, D., Sarr, A. and Mbaye, M.N. (2025) Evaluation of Cardiovascular Risk Factors in Type 2 Diabetics: 214 Outpatients at the Marc Sankale Diabetes Center in Dakar. *Open Journal of Internal Medicine*, **15**, 231-241.
https://doi.org/10.4236/ojim.2025.153021

Received: June 16, 2025
Accepted: September 5, 2025
Published: September 8, 2025

Abstract

Introduction: Type 2 diabetes is a severe chronic condition that remains insufficiently documented in sub-Saharan Africa. It is frequently associated with various cardiovascular risk factors, thereby increasing the incidence of cardiovascular diseases. The cardiovascular prognosis of patients with type 2 diabetes depends on the simultaneous control of diabetes and its associated risk factors. Thus, our study aims to determine the prevalence of these risk factors within this population. **Methodology:** We conducted a cross-sectional, descriptive, and analytical study from September 1, 2021, to January 30, 2022, including 214 type 2 diabetic patients aged 35 years or older, followed on an outpatient basis at the Marc Sankale Antidiabetic Center in Dakar. **Results:** Among the 214 patients studied, the mean age was 58 ± 9.2 years, with a female predominance of 76.6%. According to IDF recommendations, only 31.3% of the population had controlled diabetes. The risk factors associated with diabetes were: dyslipidemia with LDL ≥ 1 g/l in 83.2% of diabetics; hypertension in 62.1%. Among diabetics, 72.2% were on antihypertensive treatment, primarily ACE inhibitors (37.7% of cases). Among treated hypertensive patients, 12.5% achieved blood pressure targets below 130/80 mmHg; Sedentary lifestyle in 61.7% of cases; abdominal obesity in 52.3% and general obesity in 24.8% of cases; smoking in 4.7% of cases; microalbuminuria was found in 23.4% of diabetics. This microalbuminuria was strongly linked to the presence of hypertension (68% of hypertensive diabetic patients). The main complications included myocardial ischemia in 20.6%, renal insufficiency (11.7%), and stroke or peripheral artery disease in 1.9% of subjects. According to the Framingham score, the overall cardiovascular risk was high in 69.9% of patients, indicating a likelihood of experiencing a cardiovascular event within the next 10 years. **Conclusion:** Our study highlights that type 2 diabetes is frequently associated

with numerous cardiovascular risk factors. The simultaneous control of diabetes and its associated risk factors often results in failure, regardless of the targets set by professional guidelines.

Keywords

Cardiovascular Risk Factors, Type 2 Diabetes, Dakar

1. Introduction

Type 2 diabetes, a chronic disease in constant progression, is increasing particularly rapidly in low- and middle-income countries. According to the International Diabetes Federation (IDF), the prevalence of diabetes in Africa could increase by 95% by 2025, reaching a total of 15 million patients [1]. In Senegal, hospital statistics confirm a growing epidemic, with a marked increase in new cases diagnosed at the Marc Sankalé National Anti-Diabetic Center in Dakar. National surveys reveal a prevalence of diabetes ranging from 3.4% to 10.4%, depending on the area studied [2] [3]. Cardiovascular risk is significantly higher in diabetic patients, and certain cardiovascular pathologies are independent markers of this risk [4] [5]. Assessment of cardiovascular risk, notably by calculating scores such as the Framingham score or the SCORE diagram, is an essential step in the overall management of patients [6]. These tools enable a holistic approach and better prevention of complications. Controlling cardiovascular risk factors is crucial to improving the prognosis of diabetic patients, reducing the incidence of complications, increasing life expectancy and optimizing quality of life. Several studies, including the meta-analysis by the Cholesterol Treatment Trialist Collaboration [7], have demonstrated a significant reduction in cardiovascular morbidity and mortality through rigorous management of these factors. The main objective of this study is to assess the cardiovascular risk of type 2 diabetic patients followed as outpatients at the Marc Sankalé Center in Dakar. Specific objectives include determining the prevalence of cardiovascular risk factors, calculating cardiovascular risk according to the Framingham score, and assessing the level of control of these factors.

2. Materials and Methods

This cross-sectional study, both descriptive and analytical, was conducted from September 1st, 2021 to January 30th, 2022 at the Marc Sankalé Diabetes Center in Dakar. The sample consisted of patients with type 2 diabetes, followed as outpatients at this center. All type 2 diabetic patients aged at least 35 years, followed on an outpatient basis at the center and having consented to participate in the study, were included. Type 1 diabetic patients, hospitalized type 2 diabetics, patients with gestational diabetes and patients under 35 years of age were not included in the study. Data were collected by direct questioning and clinical examination of patients meeting the inclusion criteria. The parameters studied included epidemio-

logical, anamnestic and diabetes-related data, as well as cardiovascular risk factors. To ensure reproducibility, it's important to define a few terms. According to the French health authority in 2022, sedentary behavior is defined as a state of wakefulness characterized by an energy expenditure of less than or equal to 1.5 METs in the sitting or lying position. This corresponds to the time spent sitting or lying down without any other physical activity between getting up and going to bed, as well as the static standing position (1.3 METs). So you can be both physically active and sedentary. In 2025, the WHO defined obesity as a complex chronic disease characterized by excess fat deposits that can damage health. Abdominal obesity is an accumulation of visceral fat as evidenced by a waist circumference greater than 94 cm in men and 80 cm in women. The Framingham score was chosen for its comprehensive assessment of cardiovascular risk factors and its broad validation in a variety of settings, enabling risk estimation independent of the presence of diabetes or regional specificities, in line with the recommendations of the ESC 2021 guidelines, which emphasize the importance of using validated risk scores. A questionnaire was designed using SPSS version 11.5 (Statistical Package for Social Sciences). Data analysis was carried out using the same software. Quantitative variables are expressed as mean ± standard deviation, and the Chi^2 (Chi-square) statistical test was used to determine significance ($p < 0.05$).

3. Results

In our study, we included 214 patients meeting the inclusion criteria. The mean age of the participants was 58 ± 9.2 years, with extremes ranging from 35 to 74 years. The [60 - 70] age group was the most represented, constituting 34.6% of the study population, followed by the [50 - 60] age group, which accounted for 30%. Patients over 70 made up 13.1% of the population, while those under 40 accounted for 4.7%. Of these 214 type 2 diabetics, 164 were female (76.6%) and 50 male (23.4%), giving a sex ratio of 0.3. The mean duration of diabetes was 7.49 ± 5.98 years, with extremes ranging from 1 to 35 years. Mean venous glucose was 1.59 ± 0.75 g/l, with extremes ranging from 0.53 to 4.46 g/l. Hyperglycemia was observed in 121 patients, a frequency of 56.5%. The mean glycated hemoglobin level was 7.93% ± 2.47%, with extremes ranging from 4.20% to 20%. Fifty-five point one percent had glycated hemoglobin levels ≥ 7%. The entire study population followed hygienic-dietary measures. Biguanides, alone or combined with sulfonamides, were prescribed in the majority of cases, with a cumulative frequency of over 63%, *i.e.* almost 2/3 of the study population. Insulin therapy, alone or in combination with a biguanide, was prescribed in 30% of patients, *i.e.* around 1/3 of the population. Patients on diet alone represented less than 5% of the study population. The overall prevalence of hypertension was 62.1%, or 133 patients. Mean systolic blood pressure was 145.82 ± 22.32 mmHg (range 98 - 216 mmHg) and mean diastolic blood pressure 87.47 mmHg (range 63 - 141 mmHg). According to sex, 30 men (60%) were hypertensive in the male population, and 103 women (62.8%) were hypertensive in the female population. No significant difference was

observed between the genders (p = 0.720).

Mild hypertension was the most common, present in 77 patients, a prevalence of 57.9%, followed by moderate hypertension in 40 patients (30.1%). Severe hypertension was diagnosed in only 16 patients (12%).

Of the hypertensive diabetics, 96 (72.2%) were on antihypertensive treatment, which included ACE inhibitors, angiotensin II antagonists, beta-blockers, diuretics and calcium channel blockers. Forty-six patients were receiving antihypertensive combination therapy.

Mean weight was 74.92 ± 15.98 kg, with extremes from 45 to 130 kg. Mean patient height was 1.67 ± 0.92 m, with extremes ranging from 1.48 to 1.98 m. Mean body mass index (BMI) was 26.78 ± 5.26 kg/m^2, with extremes from 16.30 to 43 kg/m^2. Among our patients, 2 were underweight (0.9%), 90 had a normal BMI (42.1%), 69 were overweight (32.2%) and 53 were obese (24.7%). There was no significant difference in overweight between the sexes (p = 0.679). However, obesity was more frequently found in women (p = 0.017). One hundred and twelve patients (52.3%) were abdominally obese. Of these, 104 were women (92.9%), with a significant difference (p = 0.0001).

Sedentary lifestyle was observed in 132 patients (61.7%). There was a significant difference between the sexes, with 67.1% of sedentary women and 42% of sedentary men (p = 0.001). Intense physical activity was observed in only 6 diabetic patients (2.8% of the population), while 57% of the sample engaged in moderate physical activity. Smoking was observed in 10 patients (4.7%), of whom 2.4% were women and 12% men, with a significant difference between the two sexes (p = 0.005). Approximately 0.9% of diabetic smokers had quit smoking less than 3 years previously. The mean number of pack-years was 14.21 ± 8.86, with extremes from 4 to 30 pack-years. The mean total cholesterol concentration was 2.11 ± 0.53 g/l, with extremes between 0.62 and 4.65 g/l. The mean LDL-cholesterol level was 1.41 ± 0.46 g/l, ranging from 0.42 to 3.09 g/l, and 43% of patients (92) had an LDL level > 1.3 g/l. HDL-cholesterol averaged 0.55 ± 0.16 g/l, with extremes ranging from 0.13 to 1.17 g/l. 35.4% of women (58) had levels < 0.5 g/l, while 24% of men (12) had levels < 0.4 g/l. Mean triglyceridemia was 0.95 ± 0.47 g/l, with extremes of 0.28 and 4.83 g/l. Some 9.8% of patients (21) had hypertriglyceridemia. A further 16.8% of patients (36) had LDL cholesterol levels ≤ 1 g/l, and 43% (92) had levels ≤ 1.3 g/l. A level ≤ 1.6 g/l was observed in 70.6% of patients (151). Microalbuminuria (>30 mg/24 hours) was detected in 23.4% of patients (50), with no significant difference between the sexes (26% in men and 23.3% in women; p = 0.786) (Table 1). The presence of micro-albuminuria was strongly associated with hypertension, being present in 68% of hypertensive diabetic patients, versus 32% of non-hypertensive diabetics, with a significant difference (p = 0.047). Mean creatinine was 9.49 ± 2.47 mg/l, with extremes of 5.20 to 19.60 mg/l. Renal failure was diagnosed in 11.7% of participants (25). Among cardiovascular complications, a history of myocardial infarction was found in 3.3% of patients (7), myocardial ischemia in 20.6% (44), and heart failure in 2.8% (6).

A history of stroke was present in 1.9% of patients (4), as was intermittent claudication (1.9%; 4 patients). Left ventricular hypertrophy was observed in 15% of patients (32). Overall cardiovascular risk was considered high in 69.6% of cases, moderate in 24.3%, and low in 6.1%. Among the 37 untreated hypertensive patients, none had achieved the goal of blood pressure below 130/80 mmHg. Among the 96 diabetic hypertensive patients on treatment, 87.5% (84 patients) had blood pressure values above 130/80 mmHg, while only 12.5% (12) achieved this target. Considering a blood pressure threshold below 140/90 mmHg, the rate of controlled hypertensive patients was 24.7%. With regard to HDL cholesterol, 63.6% of patients (144) achieved the targets set by NCEP ATP III. For triglycerides, 90.2% of patients met the targets. In contrast, only 16.8% of the study population (36) met the target of LDL-cholesterol ≤ 1 g/l (Table 2).

Table 1. Prevalence of cardiovascular risk factors in type 2 diabetic patients.

Risk factors	Overall prevalence	Women	Men
Sedentary lifestyle	61.70%	67.70%	42%
Arterial hypertension	62.10%	62.80%	60%
Smoking	4.70%	2.40%	12%
Hyper LDL-cholesterolemia ≥ 1	83.20%	85.30%	80%
Microalbuminuria	23.40%	23.30%	26%
Obesity	24.80%	28.70%	12%
Abdominale obesity	52.30%	16%	63.40%

Table 2. Cardiovascular risk assessment in diabetic patients.

Risk factor	Low CV risk		Moderate CV risk		High CV risk	
	N	%	N	%	N	%
Hypertensive grade						
Mild hypertension	1	1.30%	9	11.70%	67	87%
Moderate hypertention	0	0%	5	12.70%	35	87.50%
Severe hypertension	0	0%	4	25%	12	75%
LDL cholesterol						
≤1	6	16.50%	9	25%	21	58.30%
1 - 1.3 g/l	4	7.30%	18	32.70%	33	60%
1.3 - 1.6 g/l	3	5%	12	20%	45	75%
≥1.6 g/l	0	0%	13	20.60%	50	79.40%
Smokers	1	10%	2	20%	7	70%
Obesity	3	5.60%	12	22.70%	38	71.70%
Gender						
Men	5	10%	15	30%	30	60%
Women	8	4.90%	37	22.60%	119	72.60%
Diabetes duration						
<5 years	8	61.50%	30	57.70%	48	32.20%
5 - 10 years	4	30.80%	13	25%	60	40.30%
>10 years	1	7.70%	9	17.30%	41	27.50%

4. Discussion

With regard to age, our study revealed an average of 58 ± 9.2 years, with extremes of 35 and 74 years. These results are almost similar to those of Thiam in 2010 [8], with an average age of 58 years, and to the Diabcare Africa study, with an average age of 54 ± 11 years in Central Africa and 57 ± 12 years in West Africa [9]. With regard to gender, our study showed a female predominance of 76.6%, *i.e.* a sex ratio of 0.30. In Africa, Belhadj [10] in Algeria in 2011 and Dembélé [11] in Mali in 2000 also reported a female predominance. This difference can be explained by women's greater access to healthcare. They consult more frequently than men, especially for gynecological and prenatal care. As a result, they are the most represented in the studies. We can also point to the nutritrional transition and the greater sedentary lifestyle of women, often due to cultural norms in our context, that value generous forms. In contrast, in the West, notably in France and the USA, the predominance is rather male [12] [13]. The mean duration of diabetes in our study was 7.49 ± 5 years, with only 23.8% of patients having had diabetes for more than 10 years. These results are close to those of another Senegalese study conducted in 2010, where the mean duration was 6.91 ± 5.91 years [8]. In Morocco, Bertalfilali *et al.* reported an average duration of 8.4 years in 2007 [14]. Longer evolution times have been observed in Western series, with 11.1 ± 4.9 years in Belgium in 2005 [15]. Biguanides, alone or in combination with sulfonamides, were prescribed in the majority of cases, with a cumulative frequency of over 63%, *i.e.* almost 2/3 of the population studied. These results are similar to those reported by Belhadj *et al.* in Algeria, where biguanides were prescribed in 63.5% of cases [10]. Patients received insulin alone or in combination with biguanides in 45.9% of cases. In the ESPOIR study, insulin therapy was present in only 9% of subjects, the most frequent treatment being the prescription of an oral antidiabetic in over 2/3 of cases (71%). A combination of insulin and oral antidiabetics was found in 18% of patients [13]. The choice of monotherapy remains possible in the absence of overweight. Indeed, in the group of obese patients in the UKPDS study treated with metformin, the reduction in diabetes-related events, total mortality and stroke appeared to be greater than in the groups treated with chlorpropamide, glibenclamide or insulin [16]. After about ten years of diabetes progression, the need for insulin therapy is frequent. The disease progressively leads to beta-cell failure, resulting in impaired insulin secretion. Thus, the natural history of the disease justifies, at one time or another, recourse to insulin therapy, a phenomenon referred to as insulinorequirement [17]. In our study, the mean glycated hemoglobin level was 7.93% ± 2%. These results are close to those of the DiabCare Africa study [9], which reported a value of 8.2% ± 2.4%. Thirty-one percent of our patients had a glycated hemoglobin level below 6.5%, a value close to the 29% found in the Diabcare Africa study [9] and the 27% reported by Charpentier *et al.* in 2003 [13]. The highest rate of patients with a hemoglobin level ≥ 8%, representing over 50% of the study population, has been described in American series [13]. The mean body mass index (BMI) of our patients was 26.78 ± 5 kg/m^2. Thiam [8]

in 2010 and Belhadj *et al.* [10] in 2011 reported a mean BMI of 25.17 ± 4.13 kg/m^2 and 28.07 ± 4.84 kg/m^2 respectively. However, BMI is higher in American studies, where McFarlane *et al.* [14] in 2002 found a mean BMI of 31 kg/m^2. Abdominal obesity was present in 52.3% of subjects, with a clear female predominance estimated at 63.4%. These results are similar to those of Belhadj *et al.* [13] in 2011, with 30% obese and 43.9% overweight. Obesity predominated in women, and was found in 80% of diabetic women according to Ndiaye *et al.* [18] in 2005. In the INTERHEART study, the risk attributable to abdominal obesity was 33.7%, being 50% higher in women than in men [19]. Abdominal obesity is associated with an increased risk of metabolic disease, cardiovascular disease and mortality [20]. The overall prevalence of hypertension was 62.1%. These results were similar to those described in France, with a prevalence of 63% [12]. A prevalence of 52.8% was found by Dembélé *et al.* [11] in Mali in 2000. Converting enzyme inhibitors were the most widely used antihypertensive class, accounting for 37.1%. This is in line with the literature: 64% in the USA [12], 41% in France [13] and 56% in Morocco [14]. However, ACE inhibitors were used less frequently (17.2% of cases) than ARBs (20.9% of cases) in the study conducted by Belhadj *et al.* [10] in Algeria in 2011. In our study, almost half of hypertensive patients were on dual antihypertensive therapy, followed by patients on monotherapy in 41.6% of cases, and finally those on triple therapy in 10.4% of cases. In the ESPOIR study, 40% were on antihypertensive monotherapy, 36% on dual therapy and 18% on triple therapy [13]. Of the 96 hypertensive diabetic patients on treatment, only 12 (12.5%) achieved blood pressure values below 130/80 mmHg. These results are comparable to those observed in other African studies [9], with an estimated control rate of 19% in East Africa and 21% in Central Africa. In our cohort, 61.7% of participants were sedentary. In Mali, Dembélé *et al.* [11] reported a prevalence of 57.6% in 2000. In our study, the low literacy rate and inadequate therapeutic education led to a lack of awareness of the primordial importance of regular physical activity in diabetes management. Large-scale cohort studies of people with type 2 diabetes have shown that regular physical activity or moderate-to-intense cardiorespiratory training is associated with a 39% - 70% reduction in cardiovascular and overall mortality over a 15 - 20-year follow-up period [20]. Smoking was present in 4.7% of subjects, with a prevalence of 2.4% in women and 12% in men. Similar data have been reported in Senegal, with a rate of 6% in 2015 [21], 10% in Algeria [10] and 17% in the USA [12]. The highest rate of smoking was observed in Hassine's [22] 2009 study in Tunisia, at 56%. The low smoking rate observed in our study could be explained by socio-cultural and religious convictions. Smoking is a major cardiovascular risk factor. More than one in ten cardiovascular deaths worldwide can be attributed to smoking, making it the leading cause of preventable cardiovascular mortality [23]. In secondary prevention, the benefits of smoking cessation have been demonstrated at all stages of coronary artery disease [24]. A 2014 meta-analysis revealed a 36% reduction in total mortality and a 32% reduction in the risk of MI in weaned coronary patients [25]. Atherogenic

dyslipidemias are essentially characterized by three abnormalities: elevated triglycerides, LDL-cholesterol and decreased HDL-cholesterol. In our study, 178 patients (83.2%) had LDL levels ≥ 1 g/L; HDL levels were low in 32.7% of cases, and triglycerides were elevated in 9.8% of the overall population. Our results are close to those reported by Thiam *et al.* [8] in 2010, with high LDL in 62.3% of diabetic patients and low HDL in 40.56%. Charpentier *et al.* [13] in France reported high LDL in 58% of the population, associated with low HDL in 52%. Statin therapy has proved effective in lowering LDL-cholesterol and reducing cardiovascular events in type 2 diabetic patients. Despite lowering LDL-cholesterol to the target level, these patients still carry a residual cardiovascular risk. This risk is partly due to the fact that statins act primarily on LDL-cholesterol, with little effect on the abnormalities typical of atherogenic dyslipidemia in type 2 diabetic patients [25]. The challenge for the coming years will be to evaluate the value of lipid-lowering treatments complementary to statins, in order to improve the cardiovascular prognosis of type 2 diabetic patients. In our study, we observed a non-negligible frequency of target organ damage. Microalbuminuria was present in 50 patients, or 23.4% of diabetics. This microalbuminuria was strongly associated with the presence of arterial hypertension, accounting for 68%. Thiam *et al.* [8] in 2010 reported microalbuminuria in a third of diabetics. Renal failure was present in 25 patients, or 11.7% of the population studied. Long-standing myocardial infarction was present in 7 patients (3.3%), myocardial ischemia in 44 (20.6%), and heart failure in 6 (2.8%). Other macrovascular impairments included a history of stroke and intermittent claudication, each found in 4 patients (1.9%). Our results are similar to those of Belhadj and Thiam [8] [10]. While diabetes is a risk factor for macroangiopathy, in the same way as hypertension, hyperlipidemia or smoking, microangiopathy appears to be specific to hyperglycemia. These complications affect the vital and functional prognosis of diabetics, and develop insidiously. They justify regular clinical and biological screening, as well as prevention and control of diabetes and associated risk factors to avoid degenerative complications. Overall cardiovascular risk was high in 69.6% of cases, moderate in 24.3% and low in 6.1%. In a study by Konaté M. *et al.*, overall cardiovascular risk according to Framingham was high in 27 patients (33%), moderate in 32 patients (39%) and low in 23 patients (28%) [26]. Cardiovascular risk was higher in women (72.6%) than in men (60%). Hypertension, regardless of severity, is associated with a high cardiovascular risk, observed in over 83% of hypertensive patients. It increases the risk of stroke sevenfold, heart failure fourfold and myocardial infarction threefold. When combined with other cardiovascular risk factors, this risk increases twentyfold [27]. Similarly, the duration of diabetes is correlated with an increased cardiovascular risk, affecting 80% of individuals whose diabetes has lasted more than ten years. A rise in LDL cholesterol above 1.6 g/l is also associated with an elevated cardiovascular risk in 79.4% of patients. The link between dyslipidemia and arteriosclerosis is particularly well established, especially as regards coronary pathologies. Increases in total cholesterol and LDL-cholesterol are associated with a cur-

vilinear rise in coronary risk. The unfavorable socio-economic conditions of some patients made it difficult to carry out the investigations needed to assess cardiovascular risk factors. Low levels of education were also an obstacle to understanding and compliance. The unavailability of equipment for ambulatory blood pressure measurement (ABPM) limited optimal assessment of blood pressure values and the efficacy of antihypertensive treatments. In the Nesta Ziza Ngaila *et al.* study in Gabon, the major limitation was the sample size in relation to the population of patients who consulted the service during the study period [28].

5. Conclusion

Type 2 diabetes, a serious chronic pathology whose prevalence continues to rise, is a major factor in increasing the incidence and severity of cardiovascular disease. Diabetic patients present a cardiovascular risk two to four times higher than that of the general population. This disease is frequently accompanied by several cardiovascular risk factors, such as hypertension, atherogenic dyslipidemia, obesity, sedentary lifestyle and smoking. These factors worsen the vital and functional prognosis of patients, contributing to significant morbidity and mortality. Our study highlights the high frequency of cardiovascular risk factors associated with type 2 diabetes. It also highlights the frequent failure to simultaneously control diabetes and these risk factors, despite the objectives defined by learned societies. This situation exposes patients to severe complications, notably cardiovascular and renal, requiring comprehensive and rigorous management to mitigate their impact.

Conflicts of Interest

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

References

[1] Organisation Mondiale de la Santé (2016) Rapport mondial sur le diabète. OMS. https://apps.who.int/iris/bitstream/handle/10665/254648/9789242565256-fre.pdf?sequence=1

[2] Ministère de la Santé et de l'Action Sociale (Sénégal) (2017) Plan stratégique de lutte contre les maladies non transmissibles (2017-2020). MSAS. https://www.sante.gouv.sn/sites/default/files/Plan%20Strat%C3%A9gique_DL_MNT.pdf

[3] Mbaye, M., Niang, K., Sarr, A., Mbaye, A., Diedhiou, D., Ndao, M., *et al.* (2011) Aspects épidémiologiques du diabète au Sénégal: Résultats d'une enquête sur les facteurs de risque cardiovasculaire dans la ville de Saint-Louis. *Médecine des Maladies Métaboliques*, **5**, 659-664. https://doi.org/10.1016/s1957-2557(11)70343-1

[4] Kengne, A.P., Patel, A., Marre, M., Travert, F., Lievre, M., Zoungas, S., *et al.* (2011) Contemporary Model for Cardiovascular Risk Prediction in People with Type 2 Diabetes. *European Journal of Cardiovascular Prevention & Rehabilitation*, **18**, 393-398. https://doi.org/10.1177/1741826710394270

[5] Leon, B.M. (2015) Diabetes and Cardiovascular Disease: Epidemiology, Biological Mechanisms, Treatment Recommendations and Future Research. *World Journal of Diabetes*, **6**, 1246-1258. https://doi.org/10.4239/wjd.v6.i13.1246

[6] Ferrières, J. (2012) Évaluation du risque cardiovasculaire. *Archives of Cardiovascular Diseases Supplements*, **4**, 248-258. https://doi.org/10.1016/s1878-6480(12)70840-6

[7] Baigent, C., Blackwell, L., Emberson, J., Holland, L.E., Reith, C., Bhala, N., *et al.* (2010) Efficacy and Safety of More Intensive Lowering of LDL Cholesterol: A Meta-Analysis of Data from 170,000 Participants in 26 Randomised Trials. *The Lancet*, **376**, 1670-1681. https://doi.org/10.1016/s0140-6736(10)61350-5

[8] Thiam Tall, A. (2010) Évaluation du niveau de contrôle des facteurs de risque cardiovasculaire chez les diabétiques de type 2: À propos de 318 cas. Master's Thesis, Université Cheikh Anta Diop.

[9] Sobngwi, E., Ndour-Mbaye, M., Boateng, K.A., Ramaiya, K.L., Njenga, E.W., Diop, S.N., *et al.* (2012) Type 2 Diabetes Control and Complications in Specialised Diabetes Care Centres of Six Sub-Saharan African Countries: The Diabcare Africa Study. *Diabetes Research and Clinical Practice*, **95**, 30-36. https://doi.org/10.1016/j.diabres.2011.10.018

[10] Belhadj, M., Malek, R., Boudiba, A., Lezzar, E., Roula, D., Sekkal, F., *et al.* (2011) DiabCare Algérie. *Médecine des Maladies Métaboliques*, **5**, 24-28. https://doi.org/10.1016/s1957-2557(11)70068-2

[11] Dembele, M., Sidibe, A.T., Traore, H.A., Tchombou-Hic-Zounet, B., Traore, A.K., Diallo, D. and Fongoro, S. (2000) Association HTA-diabète sucré dans le service de médecine interne de l'hôpital du Point G, Bamako. *Médecine d'Afrique Noire*, **47**, 12-15.

[12] McFarlane, S.I., Jacober, S.J., Winer, N., Kaur, J., Castro, J.P., Wui, M.A., *et al.* (2002) Control of Cardiovascular Risk Factors in Patients with Diabetes and Hypertension at Urban Academic Medical Centers. *Diabetes Care*, **25**, 718-723. https://doi.org/10.2337/diacare.25.4.718

[13] Charpentier, G., Genès, N., Vaur, L., Amar, J., Clerson, P., Cambou, J., *et al.* (2003) Control of Diabetes and Cardiovascular Risk Factors in Patients with Type 2 Diabetes: A Nationwide French Survey. *Diabetes & Metabolism*, **29**, 152-158. https://doi.org/10.1016/s1262-3636(07)70022-8

[14] Bertalfilali, K., Oulad, N. and Diouri, A. (2009) Prise en charge de l'hypertension artérielle chez le diabétique. *Diabetes and Metabolism*, **35**, A42. https://doi.org/10.1016/S1262-3636(09)71855-5

[15] Vandemergel, X. (2005) P01—Évaluation et perception des facteurs de risque cardiovasculaire chez les patients diabétiques. *Journal des Maladies Vasculaires*, **30**, 36. https://doi.org/10.1016/s0398-0499(05)86305-x

[16] Reichard, P., Nilsson, B. and Rosenqvist, U. (1993) The Effect of Long-Term Intensified Insulin Treatment on the Development of Microvascular Complications of Diabetes Mellitus. *New England Journal of Medicine*, **329**, 304-309. https://doi.org/10.1056/nejm199307293290502

[17] UK Prospective Diabetes Study (UKPDS) Group (1998) Intensive Blood-Glucose Control with Sulfonylureas or Insulin Compared with Conventional Treatment and Risk of Complications in Patients with Type 2 Diabetes (UKPDS 33). *Lancet*, **352**, 837-853.

[18] Ndiaye, F.K. (2005) Le diabète de type 2 à la Clinique Marie-Louise Brevié de l'Hôpital Principal de Dakar (étude descriptive à propos de 111 cas). Ph.D. Thesis, Université Cheikh Anta Diop.

[19] Yusuf, S., Hawken, S., Ôunpuu, S., Dans, T., Avezum, A., Lanas, F., *et al.* (2004) Effect of Potentially Modifiable Risk Factors Associated with Myocardial Infarction in 52 Countries (the INTERHEART Study): Case-Control Study. *The Lancet*, **364**, 937-952.

https://doi.org/10.1016/s0140-6736(04)17018-9

[20] Verdot, C., Salanave, B. and Deschamps, V. (2020) Activité physique et sédentarité dans la population française: Situation en 2014-2016 et évolution depuis 2006-2007. *Bulletin Épidémiologique Hebdomadaire*, **15**, 296-304.

[21] Agence Nationale de la Statistique et de la Démographie (ANDS) (2015) Enquête nationale sur les facteurs de risque des maladies non transmissibles. Rapport préliminaire: Les indicateurs-clés, STEPS.

[22] Hassine, M. (2009) P62 Association HTA-diabète de type 2: Prévalence et risque cardio-vasculaire. *Diabetes & Metabolism*, **35**, A43. https://doi.org/10.1016/s1262-3636(09)71860-9

[23] Houston, T.K., Allison, J.J., Person, S., Kovac, S., Williams, O.D. and Kiefe, C.I. (2005) Post-Myocardial Infarction Smoking Cessation Counseling: Associations with Immediate and Late Mortality in Older Medicare Patients. *The American Journal of Medicine*, **118**, 269-275. https://doi.org/10.1016/j.amjmed.2004.12.007

[24] Critchley, J.A. and Capewell, S. (2003) Mortality Risk Reduction Associated with Smoking Cessation in Patients with Coronary Heart Disease: A Systematic Review. *JAMA*, **290**, 86-97. https://doi.org/10.1001/jama.290.1.86

[25] Tanguy, B. and Aboyans, V. (2014) Dyslipidémie et diabète. *Revue Générale de Métabolisme*, **1**, 1-5.

[26] Massama, K., *et al.* (2022) Profil de risque cardiovasculaire des sujets diabétiques de type 2 hospitalisés à l'Hôpital du Mali. *Health Sciences and Disease*, **23**, 82-85.

[27] Elsevier (2021) Item 221—Hypertension artérielle de l'adulte. Elsevier Connect. https://www.elsevier.com/fr-fr/connect/etudes-de-medecine/item-221-hypertension-arterielle-de-ladulte

[28] Ngaila, N.Z., *et al.* (2024) Identification des facteurs de risque cardiovasculaires chez les patients diabétiques de type 2 au service d'endocrinologie du Centre Hospitalier Universitaire de Libreville (CHUL) en 2021. *Health Sciences and Disease*, **25**, 40-44.