

# Epidemiological, Clinical and Therapeutic Characteristics of Hypertensive Type 2 Diabetics at the Marc Sankale Center of Dakar

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## Abstract

**Introduction:** High blood pressure (hypertension) and diabetes mellitus are two major risk factors for cardiovascular disease, which is increasing rapidly in Africa and worldwide. Africa has the highest prevalence rate of hypertension in the world, with 46% of adults over the age of 25 with. Hypertension is common in type 2 diabetes and increases cardiovascular risk. The association of these two pathologies has many particularities in the sub-Saharan subject. The work related to this entity in Africa shows a frequency between 30% and 60%. The objective was to describe the epidemiological, clinical and therapeutic characteristics at the Medical Clinic II of the Abass Ndao Hospital Center in Dakar. **Patients Methods:** This was a cross-sectional, descriptive and analytical study conducted from 01 December 2016 to 31 January 2017. It focused on patients with cardiothorax. Epidemiological data, cardiovascular risk factors, and cardiothoracic characteristics were evaluated. **Results:** 303 cases were recorded with a prevalence of 42%, an average age of 61.63 years, a sex ratio of 0.22. The age group of [60 - 70] years was the most representative at 36.30%. The BMI (Body Mass Index) average was 27.06 kg/m<sup>2</sup>. Obesity was 25% and 35% were overweight. Dyslipidemia consisting of an increase in LDL cholesterol > 1 g/l in 79%, a hypercholesterolemia in 57%, a decrease in HDL cholesterol in 13.23% and a hypertriglyceridemia in 28%. Patients with three cardiovascular risk factors accounted for 93.72%. The average fasting glucose level was 2.85 g/l. Hyperglycemia was noted in 65%. The glycosylated hemoglobin is greater than 7% in 47%. The duration of diabetes was less than 5 years

in 133 patients or 44%. 70% of patients were treated with oral antidiabetic drugs. Insulin was used in 21.1%. Hypertension was mild in 24.1%, moderate in 23.8% and severe in 14.8%. Hypertension treated with monotherapy was 49%, combination therapy was 43%. Converting enzyme inhibitors (CEI) were used in 44%; 20% were Calcium inhibitors and 7 were treated by Angiotensin II Receptor Antagonists (ARA). The inhibitor association of the conversion enzyme/calcium inhibitors (CEI/CI) is in 22%. Statins are used in 23%. The degenerative complications concerned four cases of acute edemas of the lower limbs (AELL), four cases of stroke (AVC). 37% had a balance of the blood pressure and among them 19.5% had followed a monotherapy and 33% a combination therapy. **Conclusion:** The combination of hypertension and diabetes is common in Africa and increases cardiovascular mortality. Training in the management of diabetes and other cardiovascular risk factors is needed.

### Keywords

Diabetes, Hypertension, Risk Factors, Treatment, Senegal

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## 1. Introduction

High blood pressure (hypertension) and diabetes mellitus are two major risk factors for cardiovascular disease, which is increasing rapidly in Africa and worldwide [1] [2]. Africa has the highest prevalence rate of hypertension in the world, with 46% of adults over the age of 25 with [3]. Hypertension doubles the risk of mortality and stroke at any case; it triples the risk of coronary heart disease and accelerates the progression of diabetic nephropathy, retinopathy, and neuropathy [3]. As such, early and adequate treatment is necessary to delay these complications. Indeed, some studies exist in Africa on the association of diabetes mellitus and hypertension. According to what we know about, no study has been done so far on the combination of these two risk factors in Dakar. Hypertension is common in type 2 diabetes and increases cardiovascular risk. The association of these two pathologies has many particularities in the sub-Saharan subject.

In this way the objective of this study is to describe the epidemiological, clinical and therapeutic aspects of type 2 hypertensive diabetes at the Medical Clinic II of the Abass Ndao Hospital Center in Dakar.

## 2. Patients and Methods

It was a cross-sectional, descriptive and analytical study conducted from December 15, 2016 to January 15, 2017, for a duration of 1 month. The study was carried out at the Marc Sankale Center of the Abass Ndao Hospital Center in Dakar. This center has been the national reference center for the management of diabetes and metabolic endocrine diseases in Senegal since 1960. The study included all hypertensive type 2 diabetes patients followed in the department and having a medical record. We considered as hypertensive patients those who were

already there and followed with antihypertensive treatment. A pre-established form was used as a basis for data collection. It focused on the following elements:

- Socio professional data: age, sex, profession; ethnicity and address.
- The antecedents and risk factors associated.
- Family history (in first-degree relatives) and personal history (medico-surgical and gynecological-obstetrical). Habits and lifestyles such as smoking, alcoholism and sedentary lifestyle.
- The study of diabetes mellitus: type of diabetes, its seniority, its treatment, complications.

Para clinical assessment: Fasting blood glucose, Hba1c, renal function and micro albuminuria, electrocardiogram (ECG), fundus.

- A review of cardiovascular risk factors.

Those considered in this study, since all patients are diabetic, were: age (>55 years in men and 60 years in women), active smoking, sedentary lifestyle, blood pressure over 130 mm·Hg, obesity, dyslipidemia, microalbuminuria greater than 30 mg/24h, hypercholesterolemia > 2 g/l, HDL down < 0.35 g/l, hypertriglyceridemia > 1.5 g/l. The lipid balance was performed during a checkup.

- The treatment: low sodium diet, drug treatment of diabetes and treatment of high blood pressure, platelet and antiplatelet therapy statins.
- Diagnosis and glycemic balance.

The types of diabetes, in the absence of immunology and the peptide C assay, were presumptive based on the clinical and evolutionary arguments (age of the patient, its morph type, time of installation of the symptoms, family history and evolution under treatment).

Patients were in glycemic equilibrium if the fasting blood glucose was less than 1.08 g/l according to IDF [4] and less than 1.21 g/l according to ADA [5]. Hba1C is less than 6.5% according to IDF and below 7% according to the ADA [4].

- Hypertension.
- Definition of the Arterial Hypertension: It is a blood pressure  $\geq$  140 and/or 90 mm·Hg.
- Classification of the Arterial Hypertension.

The classification is based, if the PAS and the PAD belong to distinct categories, the highest stage is retained. WHO (World Health Organization) 1999 classification by level of AP (cuff). The **Table 1** shows the classification of hypertension according the World Health organization (WHO).

Balance of the Arterial Hypertension was judged if the BP was below 140/90 mm·Hg.

- Obesity: We also used the International Obesity Task Force classification to classify patients according to the body mass index [7]. Normal values are 18.5 to 24.9 kg/m<sup>2</sup>. Overweight is reported when 24.9 < BMI < 30 kg/m<sup>2</sup> and obesity when BMI > 29.9 kg/m<sup>2</sup> [8] [9].

**Table 1.** WHO (World Health Organization) classification of hypertension [6].

Category	PAS (mm-Hg)	PAD (mm-Hg)
Optimal	<120	<80
Normal	120 - 129	80 - 84
Normal High	130 - 139	85 - 89
Grade 1 Light	140 - 159	90 - 99
Grade 2 Moderate	160 - 179	100 - 109
Grade 3 Severe	≥180	≥110
Systolic Hypertension	≥140	<90

## 2.1. Inclusion and Exclusion Criteria

Any previously known hypertensive patient followed at the center was considered in the study. Excluded unknown hypertensive patients or patients not taking antihypertensive drugs at the time of the study. Incompletely clinical and or paraclinical records were not included in the final evaluation.

## 2.2. Statistical Analysis

We did a prospective study and the data were entered on an Excel sheet and the qualitative and quantitative variables were analyzed by the SPSS STATISTICS 18.0 software.

## 3. Results

### 1) Epidemiological aspects

During the study period, we recorded 723 diabetic patients at the Marc Sankale center of Abass Ndao hospital in Dakar. Among them there were 303 hypertensive diabetics with a hospital frequency of 42%. There were 249 women (82.18%) and 54 men (17.82%) with a sex ratio (M/W) of 0.22. The average age was 61.63 years with extreme from 31 years old to 92 years old. The age group of [60 - 70] years was the most representative with  $n = 110$  or 36.30%.

Urban patients were the most representative with a rate of 93% and 2% were of rural origin.

In our population, the Wolof, Pulars and Serer were the most represented with respectively 44%, 18% and 12%. Housewives accounted for 39% of cases. The **Table 2** shows the distribution of Patients by Sociodemographic Characteristics.

### 2) Study of risk factors

The BMI average is 27.06 kg/m<sup>2</sup> with extremes of 16.36 to 41.47 kg/m<sup>2</sup>. Obesity was 25% and 35% were overweight. The dyslipidemia was observed in our sample. It was an increase in LDL cholesterol > 1 g/l in 79%, an increase in total cholesterol > 2 g/l in 57%, a decrease in HDL cholesterol < 0.40 g/l in 13.23% and an increase of triglycerides greater than 1.5 g/l to 28%. In our study, patients with three cardiovascular risk factors accounted for 93.72%. The **Table 3** shows the distribution of patients by number of risk factors.

**Table 2.** Distribution of patients by sociodemographic characteristics.

Characteristics of Patients in Inclusion (n = 303)	
Average age	61.63 years
Age ≥ 60 years	49.1%
Women	249 (82.18%)
Sex ratio (M:F)	0.22
Urban patients	93%
Housewives	39%
The age group [60 - 69] years	110 (36.3%)
Average age of diabetes	10.3 year
Treatment OAD	(212) 70%
Glycosylated hemoglobin > 7%	144 (44%)
Hypertension severe	14.8%
Combination therapy	43%

**Table 3.** Distribution of patients by number of risk factors.

1 risk factor	1%
2 risk factor	6%
3 risk factor	20%
4 risk factor	39%
5 risk factor	20%
6 risk factor	14%
Total	100%

### 3) Diabetes study

The average fasting glucose level was 2.85 g/l. A hyperglycemia was noted in 65% of the population. The glycosylated hemoglobin greater than or equal to 7% in 144 patients is 47%. The duration of diabetes was less than 5 years in 133 cases is 44%, between 5 to 10 years in 62 cases (20%), diabetes has been evolving for more than ten years in 33%. In our study (212) patients or 70% were treated with oral anti diabetic drugs (OAD). Insulin alone was used in 21.1%.

### 4) Study of hypertension

Blood pressure was normal in 113 cases or 37.3%. Hypertension was mild in 73 cases or 24.1%, moderate in 72 cases (23.8%) and severe in 45 cases (14.8%). The treatment of hypertension in our patients was monotherapy of 49% or 148 cases, one hundred and twenty-nine patients (129) were on combination therapy or 43%; only twenty-six patients (26) had a HAART consisting solely of women. CEI were used in 65 patients (44%). Twenty-nine (29) cases or 20% were on calcium inhibitors. Ten (10) patients or 7% were treated with Angiotensin II Receptor Antagonists (ARA). Thiazide diuretics were used in 30 patients (20%) and cardiac beta blockers (CBB) in 14 cases (9%). Two types of combination were noted in dual therapy: the inhibitor association of the conversion enzyme/calcium inhibitors.

(IEC/CI) 28 patients or 22% and IEC/IUD association in 101 patients (78%). For triple therapy (HAART) three types of combination were noted in our study:

IEC/IUD/CI in ten patients 38.6%.

- IEC/IUD/CBB in eight patients 30.7% and IEC/CBB/CI in eight patients 30.7%.

Only (164) patients or 54% had a balance of blood pressure. Among these balanced patients, fifty-nine (59) patients or 19.5% had followed monotherapy, one hundred and one (101) patients or 33% had followed a combination therapy and four people were balanced by following a HAART or 1%. Of the 59 individuals who were balanced as monotherapy, six (6) were on ARA II, twenty-six (26) had normal blood pressure on ACE, nine (9) were on CBB, five had balance of tension under CI and thirteen (13) patients were under IUDs. In combination therapy (101) patients treated with IEC/IUD had normal blood pressure with sixty (28) patients treated with IEC/CI. In HAART, four patients treated with IEC/IUD/CBB showed normal tension. The lipid-lowering drugs used were statins with a 23% rate.

### **5) Study of complications**

The degenerative complications noted were four cases of acute edemas of the lower limbs (AELL), four cases of stroke, one case of myocardial infarction (MI) and three cases of renal failure. The fundus examination was performed in only forty-eight (48) patients. Of these five (1.65%) had progressive diabetic retinopathy, one patient (0.33%) had hypertensive retinopathy.

## **4. Discussion**

### **Methodology**

Our study knows certain limits. The collection of data was not exhaustive in clinical and paraclinical terms. Some additional tests were not performed in all patients because of their excessive cost in the center. All the variables studied had a satisfactory level of completeness with 95% of the variables reported.

#### **1) Epidemiological aspects**

During the study period, hypertensive diabetics accounted for a hospital frequency of 42%. This rate agrees with data from literature who estimated that Hypertension is common in patients with diabetes in Africa with rates ranging from 20% to 60% depending on the region [10]. Formerly H. Monabeka [11] in a study in the Congo found a frequency of 11.71%. Indeed, hypertension and diabetes mellitus are increasing rapidly in Africa and in the world [12] [13]. Several authors reported a few years ago 65% hypertensive subjects in people with diabetes [10] [14]. Recent multicenter data reported a prevalence of hypertension of up to 77% - 81% during T2DM in Africa [14] [15].

The average age was 61.63 years old with a female predominance. As in other series, the frequency of the diabetes-hypertensive association increases with age, particularly in the age group of 50 to 60 years and predominates in the female sex [16] [17]. In our series the age group of [60 - 70] years was the most representative with 36.30%.

#### **2) Study of risk factors**

Obesity was 25% and 35% were overweight. Overweight remains a determining factor in the occurrence of hypertension, diabetes and their complications at the individual level [18].

The dyslipidemia was observed in our sample. Atherogenic lipid profile is usually observed in diabetic patients; a Japanese study found a positive correlation between blood pressure and HDL down in diabetic hypertensive patients over the age of 50 [19]. In our study, HDL down emitted was observed in 13.23% of cases and LDL-c was greater than 1 g/l in 79% of cases an increase in total cholesterol > 2 g/l in 57%. Dyslipidemia associated to diabetes and hypertension constitutes a metabolic syndrome. It is a major risk factor for the occurrence of cardiovascular events; its correction, in particular by statins, makes it possible to reduce cardiovascular morbidity and mortality in type 2 diabetes, up to 37% compared to placebo, as observed in the CADDS study (Collaborative Atorvastatin Diabetes Study) [20] [21]. Diabetics should be sensitized to this risk for a better adherence to the prescription of the lipid balance. However, it should be emphasized that prescribers should be more benefit so that lipid exploration is systematic for all diabetics including hypertensive diabetics.

In our study, patients which three cardiovascular risk factors accounted and over accounted for 93.72%. The hypertensive associated to Type 2 diabetes increases the cardiovascular risk of the patients, through a synergistic effect [22], it is responsible for an important global and cardiovascular morbid mortality [23].

### 3) Diabetes study

The glycosylated hemoglobin greater than or equal to 7% in 144 patients or 47%. In our study, the evaluation of the glycemic balance is based on fasting glucose and glycosylated hemoglobin (HbA1c). The latter is important for the monitoring and evaluation of diabetes [24]. Efforts must be made to make it available and at a lower cost in the decentralized structures. A poor glycemic balance was noted in 65% of the population. This requires strengthening therapeutic education to improve the glycemic balance. In our study 70% were treated with oral antidiabetic drugs (OAD).

### 4) Study of hypertension

Thus, its management takes first and foremost a good control of blood pressure figures. However, beyond the problems of treatment compliance generated by the multiplication of drug intake, there is the essential question of how to determine the various parameters defining the normality of blood pressure figures [25]. In fact, although the clinical assessment of AP in the medical office is the basis of the recommendations of the French Society of Hypertension (FSH) [26], it is insufficient in certain circumstances and can lead to inadequate and/or inappropriate or even unnecessary treatment [25] [26]. MAPA may therefore appear as an effective means and may reveal hidden HTAs.

The treatment of hypertension of our patients was monotherapy of 49%, a combination therapy in 43%. Only twenty-six patients (26) had HAART. For Monabeka [11] in his study 93% of patients were on monotherapy.

ACE inhibitors were used in 44%, 20% were on calcium inhibitors and 7%

were treated with angiotensin II receptor antagonists (ARA). The lipid-lowering drugs used were statins with 23%.

In our study blood pressure was controlled in 37.3% of patients. This result is in accordance with African literature. Thus, most of African studies report a poor blood pressure control, ranging from 10% to 37% despite the high number of molecules often used. For example, in Dembélé' study in Mali involving 112 patients, almost half of the subjects were not well controlled under dual therapy [9], or Adeniyi *et al.*, in South Africa who reported 76% of uncontrolled subjects while nearly three quarters of them were on triple therapy [27]. This rate is similar to the study, conducted in Portugal, and showed that only 40% of treated hypertensive patients with diabetes are really controlled [28]. A prospective study, conducted in Tunisia on 300 known and treated hypertensive patients type 2 diabetes (DT2), showed that only 23.3% of patients are really controlled on a blood pressure level [29]. This insufficiency of blood pressure control can be explained, by the observance estimated at only 15%, itself favored by the excessive costs of treatment and the complex care pathways [27].

### 5) Study of complications

The degenerative complications noted were four cases of acute edemas of the lower limbs (AELL), four cases of stroke, one case of myocardial infarction (MI) and three cases of renal failure. The prevalence of stroke (1.32%) is consistent with that found in Algeria (2.4%) and France (1.7%) Belhadj *et al.* found in Algeria, 8.5% of arteriopathy of the lower limbs [30]. In France Bringer and al. found in 2008 a prevalence of 5.9% [31]. This low prevalence may have material reasons, some patients could pay, in addition to their treatment, came analysis biological fees.

The United Kingdom prospective diabetes study (UKPDS) has shown a linear relationship between systolic blood pressure control and the decrease in micro and macro vascular complications [32] [33]. The Action in Diabetes and Vascular Disease study: preterax and Diamicon MR Controlled Evaluation (ADVANCE) confirmed these data [34].

## 5. Conclusion

The combination of hypertension and diabetes is common in Africa and increases cardiovascular mortality. Training in the management of diabetes and other cardiovascular risk factors is needed. Other similar studies should flesh out these preliminary results.

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