

Research Article

Evaluation of Cardiovascular Risk Factors in Hypertensive Patients Received in Outpatient Clinic at Mame Abdou Aziz SY Dabakh Hospital in Tivaouane

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Abstract

Introduction: High blood pressure is the most prevalent cardiovascular risk factor worldwide. It considerably increases the risk of cardiovascular events through the involvement of well-defined target organs. The objective of this study was to study the epidemiological, diagnostic, and evolutionary aspects of arterial hypertension, and to assess the prevalence of other associated risk factors. **Methodology:** This is a cross-sectional, descriptive and analytical study carried out at the level of the outpatient internal medicine and cardiology consultations of the Mame Abdou Aziz SY Dabakh Hospital in Tivaouane, from January 1, 2021 to December 31, 2021. Patients aged 18 years or older and with hypertension treated and monitored for at least 6 months without an immediate threat to life were included. Patients with gestational hypertension and those who had expressed a refusal to participate in the study were not included. **Results:** During the study, 705 hypertensive patients out of 2192 were received, i.e. a prevalence of 32.16%. Of these, 110 patients were recruited, 8 non-included and 102 included. The average age was 61.3 ± 11.41 years with a predominance of the age group of 46 to 65 years which accounted for 52%. The female sex was predominant, accounting for 70.59%. 24.51% of patients had well-controlled blood pressure. The most prescribed therapeutic protocol was dual therapy accounting for 46.53%, followed by triple therapy (29.7%) and monotherapy (23.76%). Physical inactivity was the predominant risk factor accounting for 48.04%, followed by dyslipidemia (44.11%) and diabetes (37.25%). Stress was present in 38.23% of patients and obesity in 13.7%. Smoking accounted for 1.96% and a family history of cardiovascular disease was reported by 29.41% of patients. Cardiovascular complications were the most frequent, accounting for 68.61%, followed by renal complications (6.86%), and strokes (5.88%), all of which were ischaemic. The overall cardiovascular risk was low in 0.9% of cases, moderate in 41.2% of cases, and high in 57.9% of cases. **Conclusion:** Cardiovascular morbidity and mortality in rural areas

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Received: 4 October 2025; **Accepted:** 14 October 2025; **Published:** 7 November 2025



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is increasing and deserves special attention. A good knowledge of high blood pressure and other cardiovascular risk factors is the key to prevention.

Keywords

High Blood Pressure, Cardiovascular, Risk Factors, Tivaouane

1. Introduction

Cardiovascular disease is a group of disorders affecting the heart and blood vessels [1]. The number of deaths attributable to cardiovascular diseases is estimated at 17.7 million, or 31% of total global mortality. Of these deaths, an estimated 7.4 million are due to coronary artery disease and 6.7 million to stroke. More than three-quarters of cardiovascular disease-related deaths occur in low- and middle-income countries [1].

Noncommunicable diseases are increasingly becoming the leading cause of death in sub-Saharan Africa, where they were responsible for 37% of mortality in 2019 [2]. In Senegal, this rate was 19.5% in 2019, according to WHO data published by the World Bank [3].

High blood pressure (hypertension) is one of the most frequently encountered cardiovascular risk factors (CVRF)-in practice and the most widespread in the world. It considerably increases the risk of cardiovascular events through the involvement of well-defined target organs. Hypertension multiplies the risk of stroke by 7 to 9, the risk of heart failure by 5, and the risk of coronary artery disease by 3 [4, 5]. In all African countries, it is a cause for concern and accounts for 20 to 30% of hospital admissions [6]. According to data from the STEPS survey, in 2015, one in 4 men and one in 5 women had hypertension worldwide. In Senegal, 29.8% of adults are hypertensive. There is a linear relationship between blood pressure level and cardiovascular risk regardless of age [4].

The interest of the evaluation of VSRDFs lies in the fact that, on the one hand, controlling or treating them drastically reduces the risk of cardiovascular disease is necessary for therapeutic decision-making in a patient with cardiovascular pathology.

Many studies in Senegal and even in Africa have focused on the evaluation of cardiovascular risk factors in hypertensive patients.

The objectives of our study were:

General objective:

To assess cardiovascular risk factors associated with high blood pressure in patients received on an outpatient basis at the Abdoul Aziz Sy Dabakh Hospital in Tivaouane.

Specific objectives:

- 1) To study the epidemiological aspects of hypertension in an outpatient setting at the Abdoul Aziz Dabakh Hospital in Tivaouane.
- 2) Assess its clinical, paraclinical, evolutionary and

therapeutic aspects.

- 3) To determine the prevalence of CVRF in hypertensive patients received on an outpatient basis at the Abdoul Aziz SY Dabakh Hospital in Tivaouane.

2. Material and Method

This was a descriptive and analytical cross-sectional study conducted from January 1 to December 31, 2021 at the level of the outpatient internal medicine and cardiology consultations of the Abdou Aziz Sy Hospital in Tivaouane (Senegal).

2.1. Study Population

Our study concerned all the people who came to consult in cardiology and internal medicine.

2.2. Inclusion Criteria

The study included any patient aged 18 years or older, with hypertension followed in the hospital, treated for at least 6 months and without immediate threat to life.

2.3. Non-Inclusion Criteria

- + Pregnancy hypertension
- + Refusal to participate in the study

2.4. Data Collection and Analysis

The data were collected on the basis of a questionnaire containing different parameters. Patients were interviewed and examined at the time of consultation after free and informed consent. The data for our study had been collected and stored in Excel (version 16.66.1). The tables and graphs had also been designed using Excel software. The significance tests and calculations of the P-values were carried out using the Prism software (version 9.0).

Parameters studied: we had collected the following data on the survey sheet.

2.4.1. Socio-demographic Data

Gender, age of the patient, level of education of the patient (uneducated, primary, secondary, university level), profession (primary and secondary sector), marital status, telephone contact.

2.4.2. Personal History

Ischemic or hemorrhagic stroke, anemia, impaired kidney function, and other history.

2.4.3. Habits and Lifestyle

Active or long-form smoking (For no more than 3 years), excessive alcohol consumption: more than 30g per day for men and more than 20g per day for women, diet too rich in salt and fat, a sedentary lifestyle defined as a practice of less than 30 minutes of physical activity per day, stress.

2.4.4. Reasons for Consultation

Dyspnea, cough (whether or not associated with sputum or hemoptysis), palpitations, precordia, hepatalgia, headache, vertigo, tinnitus, diplopia, epistaxis.

2.4.5. General Examination Data

Alteration of the general condition such as asthenia, anorexia, weight loss, staining of the mucous membranes (pale, sparse, well stained, icteric or not), the presence or absence of edema of the lower limbs, the constants (blood pressure which was considered controlled when it was less than 140/90 mmHg, heart rate, BMI, waist circumference).

2.4.6. Physical Examination Data

It focused mainly on the cardiovascular system and was divided into 2 categories of signs:

- 1) Right signs: Hepatomegaly, jugular venous turgidity, Hepatojugular reflux, Harzer's sign, Right gallop sound, Tricuspid insufficiency murmur.
- 2) Left signs: Auscultatory tachycardia, Mitral insufficiency murmur, Left gallop sound, Crackling on pleuropulmonary examination.

2.4.7. Paraclinical Data

- 1) Biology: Blood count and complete count (In search of anemia), fasting blood glucose, renal assessment (azotemia, creatinine and creatinine clearance), microalbuminemia, uricemia, proteinuria, blood ionogram, lipid profile (total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides). Cut-off values for dyslipidemia were those of the National Cholesterol Education Program and the American Diabetes Association.
- 2) Electrocardiogram: The abnormalities sought were: Arrhythmias, signs of overload, repolarization disorders and other abnormalities such as Q wave necrosis, defect in the progression of the R wave.

- 3) Chest X-ray: The abnormalities looked for were: Cardiomegaly (If cardiothoracic ratio >50%), alveolar syndrome.
- 4) Transthoracic echocardiography: The abnormalities looked for were: Signs of ischemic heart disease (Ventricular kinetics disorder), Signs of hypertensive heart disease (Left ventricular hypertrophy, Obstructive or non-obstructive subaortic septal bulge), Stages of heart disease (LVEF impaired or conserved).
- 5) Arteriovenous Doppler ultrasound of the lower limbs: The abnormalities looked for were signs of venous thrombosis or signs of PAD.

2.4.8. Risk Factors

- 1) *Non-modifiable*: Age (from 50 years old in men and 60 years old in women), Sex, Family history of cardiovascular disease, Menopause.
- 2) *Modifiable*: Diabetes, Dyslipidemia, Smoking, Obesity, Physical inactivity, Stress.

2.4.9. Treatment

- 1) Hygienic and dietary measures: Diabetic diet, low-sodium diet in the evening or sodium-free diet
- 2) Medications: Antihypertensive drugs (diuretics, beta-blockers, angiotensin-converting enzyme 1 inhibitors, angiotensin receptor antagonists, calcium channel blockers), statins, antiarrhythmics (digitalis, amiodarone), vitamin K inhibitors (acenocoumarol), anti-anaemia drugs (antiplatelet agents)

2.5. Ethical Aspect

The data collected had been processed and stored in a way that maintained confidentiality. All patients had been identified with free and informed consent and had been given free access to their data provided to them individually.

3. Results

3.1. Prevalence of High Blood Pressure

The prevalence of outpatient hypertension was therefore 32.16% (705 patients out of 2192). We included 102 patients.

Socio-demographic data: The average age was 61.3 years with extremes of 26 and 88 years. The 46 to 65 age group was the most representative. The female sex was predominant with a sex ratio of 0.42. A small proportion were professional, i.e. 34 patients, with a predominance of the primary sector. Our study population consisted of 37 in-school and 65 out-of-school patients. The bride and groom were 77 in number, i.e. 75.49%. Most of our patients were sedentary and had a diet rich in fat and salt.

The most common pathologies found in the anamnesis of patients in our sample were anemia, impaired renal function

and stroke. Most of our patients were sedentary and had a diet rich in fat and salt. [Table 1](#) shows the distribution of patients by socio-demographic profile.

Table 1. Distribution of the population by socio-demographic data.

Variable	modality	Frequency (n)	Percentage (%)
Age	Average	61,3 years	
	Maximum	88 years	
	Minimum	26 years	
	≤ 45 years	12	12%
	46-65 years old	53	52%
Sex	> 65 years old	37	36%
	Female	72	71%
	masculine	30	29%
Profession	Primary	25	74%
	Secondary	9	26%
	None	65	63,73%
Level of education	Primary	11	10,78%
	Upper	10	9,8%
	Qur'anic	6	5,88%
	Secondary	7	6,86%
	Medium	3	2,94%
Marital status	Married	77	75%
	Widow	22	22%
	Divorced	2	2%
	Bachelor	1	1%
	RCM	8	7,84%
History and habits	STROKE	4	3,82%
	Anaemia	16	15,69%
	Sedentary lifestyle	49	48,04%
	Fatty diet Salty diet	28	28,43%
	Thyroidectomy	24	24,5%
	Viral hepatitis B	1	0,98%

3.2. Clinical Data

The most frequently reported reason for consultation was headache in 7 patients followed by Dieulafoy's signs, reported in 15% of cases.

The mean BMI in our cohort was 25.36 ± 5.14 Kg/m², with extremes of 12.8 and 43.15 Kg/m². The mean systolic blood

pressure was 151.7 ± 22.09 mm Hg, and the mean diastolic blood pressure was 92.84 ± 14.94 mm Hg. It was uncontrolled in 75% of cases, mostly in patients whose hypertension progressed between 1 and 5 years. Among the 77 patients in whom hypertension was uncontrolled, it was grade I in 61.04% of cases (n=47), grade II in 25.97% of cases (n=20). Physical examination showed signs of heart failure. The various clinical data are mentioned in [Table 2](#).

Table 2. Distribution of patients according to clinical characteristics.

Variable	Modality	Frequency (n)	Percentage (%)
Functional signs	Headache	7	6,86
	Tinnitus	4	3,92
	Dizziness	2	1,96
	Asthenia	2	2
	Emaciation	4	4
General signs	Abdominal obesity		
	Men	34	33,3%
	Wives	86	84,72%
	Edema of the lower limbs	4	4%
	ICG		
Cardiovascular Signs	IM Breath	2	1,96
	Pulmonary crackling	7	6,86
	Left canter sound	1	0,98
	ICD		
	Hepatomegaly	2	1,96
	VJ Turgidity	5	4,9
	Hepatojugular reflux	3	2,94
	IT Breath	2	1,96
	Overall CI	6	60%
	High blood pressure		
	Grade 1	47	61
	Grade 2	20	26
	Grade 3	12	13
	Grade 3	12	13

3.3. Paraclinical Data

The main laboratory abnormalities were:

hypercholesterolemia in 43 patients (44.44%) followed by anaemia found in 29 of the patients (28.43%) and hyperglycemia in 22 patients (22%). The various anomalies are listed in Table 3.

Table 3. Summary of Observed Biological Abnormalities.

Biological parameters	Workforce (n)	Frequency (%)
Anaemia	29	28,43
High fasting blood sugar	22	22
High total cholesterol	43	44,44
Low HDL cholesterol	23	23,46

Biological parameters	Workforce (n)	Frequency (%)
High LDL cholesterol	18	18,18
High triglycerides	4	4,08
Elevated creatinine	11	10,78
Elevated microalbuminuria	4	44
Elevated Uricemia	8	44,44
Hypernatremia	8	8,16
Hyponatremia	8	8,16
Hyperkalemia	3	3,06
Hypokalemia	9	9,18

The electrocardiogram was done by one hundred and one patients. The latter was normal in 35 patients, and left ventricle hypertrophy (LVH) was objectified in 33.66% of cases with the mean of the Sokolov-Lyon indices at 37 mm

and the mean of the Cornell indices at 26 mm. Table 4 shows the distribution of the study population based on electrocardiogram abnormalities.

Table 4. Distribution of the population by ECG abnormalities.

Anomalies	Workforce (n)	Percentage (%)
Rhythm		
Sinus tachycardia	3	2,97
Sinus bradycardia	3	2,97
Atrial fibrillation	8	7,92
Atrial Flutter	1	0,99
Ventricular Extrasystole	3	2,97
Atrioventricular conduction		
Atrioventricular bloc 1	1	0,99
Intraventricular conduction		
Right bundle branch block	6	5,94
Left bundle branch block	1	0,99
Anterior hemibloc	2	1,98
Signs of overload		
Left ventricle hypertrophy	34	33,66
Left auricle hypertrophy	14	13,86
Right auricle hypertrophy	4	3,96
Right ventricle hypertrophy	1	0,99

In our sample, only 7 patients had a chest X-ray, with an average cardiothoracic ratio equal to 0.53. Echocardiography

was performed in 66 patients. It returned normal in 22.73% of cases, i.e. 15 patients. There was a predominance of

hypertensive heart disease present in 62.12% of cases, i.e. 41 patients. Table 5 below shows the distribution of the

population according to the results of echocardiography.

Table 5. Distribution of the population according to echocardiography results.

Type of heart disease	Workforce (n)	Percentage (%)
Hypertensive heart disease		
Non-obstructive sub-aortic septal bulge	13	19,7
LVH	21	31,82
Conserved LVEF Hypertensive Cardiomyopathy	5	7,57
Altered LVEF Hypertensive Cardiomyopathy	2	3,03
Ischemic heart disease		
Conserved LVEF ischemic cardiomyopathy	1	1,52
Altered LVEF ischemic cardiomyopathy	2	3,03
Mixed heart disease	2	3,03
Mixed LVEF Altered Cardiomyopathy		
Other	5	7,57
No abnormality	15	22,73

Arterial Doppler ultrasound of the lower limbs had been performed in only 2 of our patients. Only one had shown an abnormality of the type of diffuse mediocalcosis of the posterior tibial and the other was normal.

3.5. Associated risk Factors

Age was a gender-based risk factor in 69.6% of patients. In our study population, 30 patients had at least one 1st degree relative with cardiovascular disease with a predominance of high blood pressure. Thirty-eight patients or 37.25% were known to be diabetic and all were type 2. Forty-five patients,

or 44.11% of our cohort, had dyslipidemia. Only 2 patients were known to smoke. In our sample, 16 patients or 15.68% were obese. Thirty-nine patients, or 38.23% of our study population, reported being exposed to stress on a daily basis. Forty-nine patients, or 48.04%, said they practiced less than 30 minutes of physical activity per day. In total, 61 patients, or 60% of our cohort, had accumulated more than 3 cardiovascular risk factors (CVRF) other than hypertension. Figure 1 shows the distribution of the population based on the number of cumulative CVRF and Table 6 shows the summary of all the CVRF present.

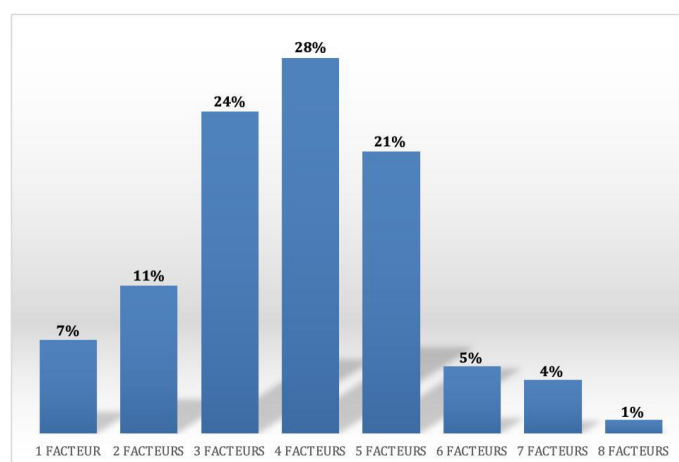


Figure 1. Population distribution by number of associated CVRF present (%).

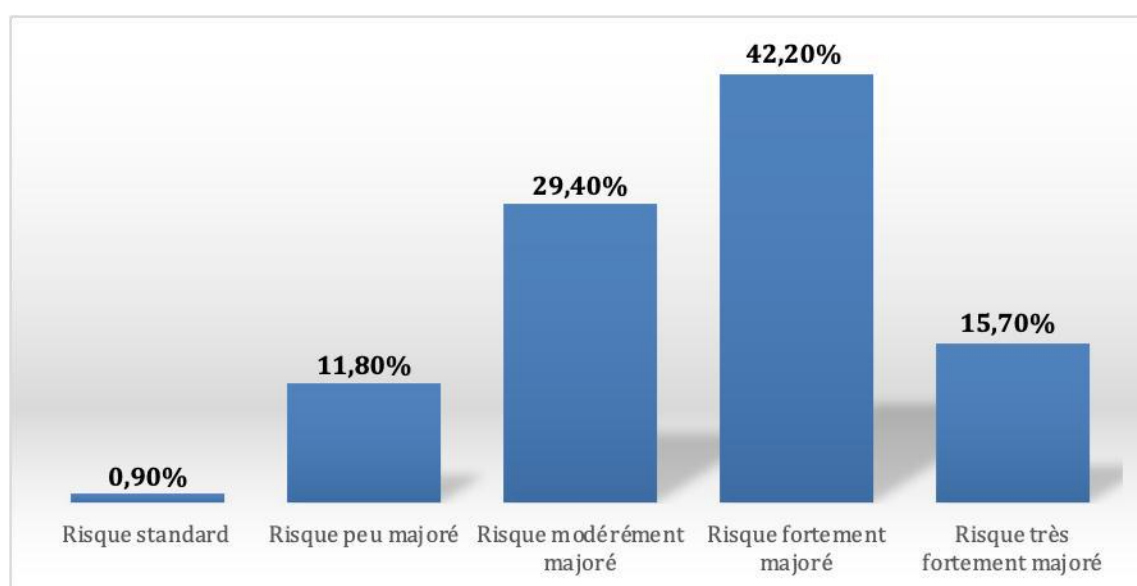
Table 6. Summary of risk factors in the study population.

Risk factor	Workforce (n)	Frequency (%)
Age	71	69,6
Family history	30	29,41
Diabetes	38	37,25
Dyslipidemia	45	44,11
Smoking	2	1,96
Global obesity	16	15,68
Stress	39	38,23
Sedentary lifestyle	49	48,04

3.6. Overall Cardiovascular Risk

It was evaluated according to the model of the High

Authority for Health (ESH). In our study, the most representative category was that of patients with a significantly increased overall cardiovascular risk, as illustrated in the following figure (Figure 2).

**Figure 2.** Population distribution by overall cardiovascular risk (%).

3.7. Regularity of Treatment Follow-up

A total of 101 patients were under treatment. In 92% of cases, the treatment was regularly followed.

3.8. The type of Treatment

Almost all of the patients we studied were on antihypertensive treatment. Fifty-one of them were put on a special diet, 41% of whom were on a low-sodium diet in the

evening. Calcium channel blockers were the most prescribed therapeutic class of monotherapy. Dual therapy was the most prescribed therapeutic protocol. Several associations have been identified in our patients on dual therapy. Table 7 shows the distribution of combination therapies among patients on triple therapy.

The other drugs most frequently found in combination with antihypertensive treatment in our study were statins in 29 patients (30%), anti-anaemic drugs in 8 patients (8%), oral anti-diabetic drugs in 38 including metformin 31 (31%),

sulfonylurea in 21 patients (20.58%), insulin in 7 patients (7%). Treatment of other comorbidities was prescribed according to etiology and clinical manifestations.

Table 7. Distribution of molecules prescribed as monotherapy.

Monotherapy	Workforce (n)	Frequency (%)
ARA 2	4	17
Calcium channel blocker	11	46
IEC	9	37
Dual therapy		
ICalc + ARA 2	1	2,13
B blocker + Thiazide	2	4,26
ICalc + Loop Diuretic	2	4,26
ARA 2 + Loop Diuretic	2	4,26
ICalc + Thiazide	3	6,38
ARA 2 + Thiazide		
Triple therapy		
Blocker + ACE inhibitor + Diuretic	2	6,67
ICalc + ARA 2 + Diuretic	9	30
ICalc + ACE inhibitor + Diuretic	9	30
ICalc + Blocker + Diuretic	5	16,67
ICalc + Blocker + IEC	3	10
Nitrate derivatives + ACE inhibitors + Diuretics	1	3,33
Blocker + Diuretics + ARB2	1	3,33

3.9. Evolution and Prognosis

A total of 52 patients in our work had presented complications of hypertension. Table 8 shows a summary of the complications identified.

Table 8. Summary of complications.

Complications	Workforce (n)	Frequency (%)
Cardiovascular		
LVH	34	33,33
CTAF	8	7,84
Heart failure	10	9,8
APE	4	3,92
Myocardial necrosis	7	6,86
Mediocalcosis of the posterior tibial	1	0,98
Altered LVEF ischemic heart disease	2	1,96
Kidney	7	6,86

Complications	Workforce (n)	Frequency (%)
Brain		
stroke	6	5,88
Death	3	2,94

Analytical study: We found that LVH was more common in females with an rr of 1.127; in grade 3 hypertension with an rr of 2.31. Atrial fibrillation was common in diabetics with an rr of 1.32. The overall cardiovascular risk was high in 50% of patients who had a CTAF with significant P-value=0.4210. Myocardial necrosis was more correlated with advanced age, diabetes, dyslipidemia with relative risks of 1.47; 1.58 and 3.42. Heart failure was more common in males with a relative risk of 1.43 and grade 3 hypertension with a relative risk of 1.42. The occurrence of these complications is strongly correlated with the severity of cardiovascular risk with a p value of 0.0402.

4. Discussion

The prevalence of hypertension in our cohort was much lower than those found in other studies. In Senegal, in a study carried out in Thiès by Affangla et al, the prevalence of hypertension was 52.75% [7]. Between 2006 and 2007, Godet-Thobie et al had obtained a prevalence of 31% in metropolitan France [8]. The STEPS survey in the Central African Republic found a rate of 27.1% [9]. These considerable differences in the prevalence rates of hypertension from one region to another can be explained by the fact that the true value is probably underestimated in our regions.

The frequency of hypertension gradually increases with age. The gradual decline in the number of cases of hypertension from the age of 65 could be explained by the low life expectancy in our countries. The average age in our population was similar to other studies in Africa. Fourcade et al reported in a study conducted in 4 sub-Saharan African countries (South Africa, Cameroon, Tanzania and Zimbabwe) a prevalence of 57.4% in men and 61.5% in women, for the age group of 60 to 69 years [10]. According to Makani et al, in Congo in a hospital setting in 2009, age was a risk factor for 50.5% of hypertensive patients [11]. According to the literature, this tendency can be explained by the fact that the arterial wall stiffens with age.

Our study showed a high predominance of the female sex. These results can be superimposed on the studies conducted in Senegal on hypertension in 2013 by Kâ et al in a semi-urban population in Guéoul where women represented 74.6% of the sample with a radio sex M/F of 0.34 [12]. A female predominance has also been noted in other studies in Africa, notably in Abidjan in 2011 where Kramoh et al revealed a

female proportion of 54.3%, in the Central African Republic 63.4% according to the STEPS survey and in Togo 63.8% according to Damorou F et al [12-14].

This female predominance can be explained by obesity and a sedentary lifestyle.

Our work revealed that out-of-school patients were the most affected by hypertension. The frequency of hypertension is therefore inversely proportional to the level of schooling. The STEPS survey conducted in Benin and the work of Godet-Thobie et al in France between 2006 and 2007 also showed similar results [8, 15].

These results can be explained by the difficulty of accessing, understanding and adhering to the various preventive measures by people with a low level of education.

Non-workers were the most affected patients with hypertension in our cohort. Among workers, the primary sector predominated (74%). Even though our figures were much higher than those of the other studies, the same trend was observed in the STEPS survey conducted in Benin (55.7%) [15].

This can be explained by the fact that we are in a rural area, an area where activities are mainly dominated by the informal sector and where women, who were the predominant sexes in our study, are often sedentary.

Hypertension and diabetes were associated in some patients with a male predominance. Higher percentages could be observed by Affangla et al (52.75%) with female predominance of 75.13%, which is in agreement with our figures [7].

The frequency of the association of hypertension and diabetes was also observed by Damorou et al in Lomé in 2011 (10.6%) [16]. The female predominance 71.05%. This is in line with the results of the DiabCare study conducted by Mbaye et al, with a female predominance at 75.1%, and with the results of the work of Affangla et al (69.6%) [7, 13].

This high frequency of diabetes in hypertensive patients could be explained by the usual presence of factors such as a sedentary lifestyle and diet in women.

Our study revealed overweight and abdominal obesity. Higher figures were obtained in Thiès (Senegal) by Affangla et al (41%) [7]. Physical inactivity was the predominant risk factor, with a predominance of women. However, our figures are much lower than those obtained in other studies such as that of Affangla et al at the St Jean de Dieu hospital in Thiès (Senegal) (62.27%) with a female predominance (74.76%) [7].

In Tivaouane we obtained a relatively high prevalence of dyslipidemia. Total hypercholesterolemia was the most common dyslipidemia, followed by hypo-HDL-cholesterolemia, then hyper-LDL-cholesterolemia and hypertriglyceridemia. While at the St Jean de Dieu hospital in Thiès, hypo-HDL-cholesterolemia was the most common with 28.21% and total hypercholesterolemia represented 14.29% according to Affangla et al [7]. Figures consistent with ours were obtained by Lokrou in Côte d'Ivoire in 1998, which reported total hypercholesterolemia at 44% and hypo-HDL-cholesterol at 37.2% [17]. These differences in the prevalence of dyslipidemia could be explained by dietary habits, which vary according to culture and country.

Stress was present and affected women more than men. Its prevalence was 47% in the study carried out on the cardiovascular profile of hypertensive patients in consultation at the St Jean de Dieu Hospital in Thiès (Senegal) by Affangla et al [7]. According to Gombet et al in 2007, this prevalence was 70% in the Brazzaville workplace [18]. This difference between our figures and those of the Brazzaville professional environment could be explained by the higher level of stress in the workplace.

A family history of cardiovascular disease was reported during our investigation. For Makani et al., in the Brazzaville cardiology community in 2015, this rate was 7.1% [11]. In addition, parental hypertension was associated with higher mean blood pressure in offspring in Charlotte Anderson's study of the association between parental hypertension and arterial stiffness in non-hypertensive children [19].

Heredity is thought to be a determining factor in the onset of hypertension. High blood pressure has obvious genetic bases from the literature [20]. A good knowledge of one's family history of cardiovascular disease therefore allows for better primary prevention.

Cardiac complications were the most common in our study. M'Baïssouroum in his 1993 study in N'Djamena also obtained a predominance of cardiac complications with 27.96% while strokes were present in 9.32% of cases, and renal failure in 3.3% of cases [21]. In 2007, Nguetta et al had obtained a prevalence of 45.3% for cardiac complications in hypertensive patients in Ivory cost. Strokes accounted for 5.9%, and kidney damage 6% [22].

Hypertension is a common cause of heart failure. In Thiès (Senegal), in 2019, Affangla et al found hypertension as a cause of heart failure in 49.05% of cases [7]. In a study conducted in Dakar (Senegal) by Mbaye et al, hypertension was the most common non-valvular cause of atrial fibrillation [16]. The strongest association between family history and cardiovascular disease unrelated to stroke was observed in the Dutch (OR, 2.47; 95% CI 1.37-4.44) and stroke among Afro-Surinamese (OR, 2.17; 95% CI, 1.32-3.57) in the study by Luca Valerio et al. in the Netherlands [23]. There is therefore a strong correlation between hypertension and the occurrence of a stroke. According to Contegal et al., high

blood pressure is by far the most potent and common risk factor for stroke, but it is also the most modifiable risk factor [24].

The overall cardiovascular risk in our series was high. This cardiovascular risk profile has also been observed in several other studies, notably in Thiès at the St Jean de Dieu hospital where Affangla et al had reported a high overall cardiovascular risk in 67.76% of cases, moderate in 21.24% and low in 10.99% [7]. The same trend was observed in Lomé where the risk was high in 58.05% of cases [14]. According to Makani et al, this risk was high in 72.7% of cases [11]. A risk profile contrary to ours was obtained by Diatta et al in 2018 with a low cardiovascular risk for 69.24% of workers, medium for 11.96%, high for 12.82% and very high for 5.98% [25].

This predominance of the overall high cardiovascular risk in our series can be explained by the late diagnosis of high blood pressure linked to a lack of knowledge of the disease and its preventive measures, but also by the duration of hypertension which was more than 5 years in 28% of our patients, which favors the onset of cardiovascular complications. The association of hypertension with other cardiovascular risk factors, particularly diabetes (in 38% of cases) has also largely contributed to this high prevalence of overall cardiovascular risk.

5. Conclusion

High blood pressure (hypertension) is the most common cardiovascular risk factor worldwide. It considerably increases the risk of cardiovascular events through the involvement of well-defined target organs.

Cardiovascular morbidity and mortality in rural areas is increasing and deserves special attention. A good knowledge of high blood pressure and other cardiovascular risk factors is the key to prevention.

Abbreviations

LVEF	Left Ventricle Ejection Fraction
STEPS	Stepwise Approach to Surveillance
PAO	Aortic Pressure
CI	Interventricular Communication
WHO	World Health Organization
Hypertension	High Blood Pressure
STEPS	Phased Approach to Surveillance
FDRCV	Cardio Risk Factor
BMI	Body Mass Index
PAD	Peripheral Arterial Disease
CKD	Chronic Kidney Disease
ICG	Left Heart Failure
CDI	Right Heart Failure
Overall CI	Global Heart Failure
LVH	Left Ventricular Hypertrophy

AHB	Anterior Hemiblock
LAH	Left Atrial Hypertrophy
RAH	Right Atrial Hypertrophy
RVH	Right Ventricular Hypertrophy
LVEF	Left Ventricular Ejection fraction
ARA2	Angiotensin Receptor 2 Antagonist
ACE inhibitor	ACE Inhibitor
ICalc	Calcium Channel Blocker
CTAF	Complete Tachycardia Due to Atrial Fibrillation
APE	Acute Pulmonary Edema
DALY	Ischemic Stroke

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Conflicts of Interest

The authors declare no conflicts of interest.

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