

## Association of Arterial Hypertension (HTA) and Diabetes: Epidemiological, Clinical and Therapeutic Aspects in the Internal Medicine Unit at the Fousseyni Daou Hospital in Kayes

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### Abstract

### Original Research Article

**Introduction:** This study aimed to study the epidemiological, clinical and therapeutic aspects of arterial hypertension in diabetic subjects followed at the Internal Medicine Unit at the Fousseyni Daou Hospital in Kayes. **Patients and Methods:** This was a descriptive retrospective study carried out from January 1, 2019 to December 31, 2019 (12 months) at the Internal Medicine Unit of the Fousseyni Daou Hospital in Kayes. Included were diabetic and hypertensive patients (PAS  $\geq$  140 mmHg and/or PAD  $\geq$  90 mmHg) aged 15 years and older followed in an outpatient setting or hospitalized. **Results:** 406 diabetic subjects were recorded including 157 cases of hypertension associated with diabetes, i.e. an overall prevalence of 38.67%. The age group of 50 -59 was the most affected with 44.58% and the average age was 51 years with extremes of 29 - 82 years. The female sex predominated with 57.96% with a sex ratio of 0.72. According to origin, 64.97% lived in the urban area (city of Kayes) against 35.03% of patients who came from the rural area. Housewives predominated with 40.13%. The functional signs frequently encountered were headaches 66.88% and dizziness 49.04%; polyuria 40.76%; polydipsia 41.40%, weight gain. The majority of patients had type 2 diabetes with 98.73% against 1.27% of type 1. In 24.84% hypertension existed before diabetes and was treated; in 52.87% it was discovered at the same time, in 22.29% it occurred later. Thus, in 122 cases out of 157, i.e. 77.71% of cases, hypertension preceded or was discovered at the same time as diabetes. The hypertension was at grade 2 with 33.75% followed by grade 1 with 32.51%. The associated cardiovascular risk factors found were age > 50 years in men 27.39%, and 60 years in women 35.03%; sedentary lifestyle 63.06%. Peripheral neuropathy 63.06%, hypertensive retinopathy 15.19%, diabetic retinopathy 10.19% were the main complications found. Measurement of fasting blood sugar in our patients showed 24.84% normal blood sugar (0.8 and 1.20g/l); 70.06% hyperglycaemia (glycaemia > 1.26g/l) and 5.09% hypoglycaemia (glycaemia < 0.70 g/l). A good glycemic balance was notified in 25.48% of the patients against 74.52% of bad glycemic balance. The combination of ACE inhibitor and hydrochlorothiazide (HCT) (dual therapy) 42.62% represented the treatment of choice for hypertension in our patients followed by calcium channel blockers with 38.21%. The lifestyle and diet alone or associated with drug treatment was recommended for all patients. The association metformin and sulfonamide was the treatment of choice for diabetes with 54.14% against 19.11% for metformin alone and 15.92% for insulin. Patients hospitalized for hypertension-diabetes were 22 including: foot wounds 27.27%, 9.09% ischemic stroke, 9.09% IDM, 9.09% chronic renal failure. The outcome of the hospitalization was marked 1 case of death (4.55%), 2 patients (9.09%) were referred to Bamako for dialysis, 19 patients (86.36%) were released improved. **Conclusion:** Hypertension is a frequent pathology in diabetic patients requiring early management in order to reduce the occurrence of degenerative complications and improve the prognosis of the diabetic patient.

**Keywords:** Prevalence, hypertension, diabetes, internal medicine, Fousseyni Daou hospital in Kayes.

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## INTRODUCTION

Arterial hypertension and diabetes are two major cardiovascular risk factors on the rise in Africa and throughout the world [1, 2]. They are frequently associated with and responsible for significant overall cardiovascular morbidity [2].

According to the WHO in 2014, one in three adults worldwide suffered from high blood pressure and one in ten suffered from diabetes [3].

In France, various studies have shown that 50 to 58% of type 2 diabetics are hypertensive [4].

In Africa, arterial hypertension is approximately twice as common in subjects with diabetes (T1D and DT2) than in the rest of the population, with rates ranging from 20 to 60% depending on the region [5, 6].

Recent African data report a prevalence of up to 60 - 81% during T2D [5-9]. In Mali, several studies on the intra-hospital prevalence of hypertension in diabetics demonstrate the increasingly important place that this association takes in the daily practice of the doctor with variable results according to the authors [9-16].

The absence of data on this subject; the high frequency of the association of these two major cardiovascular risk factors; the therapeutic difficulties and the degenerative complications presented by the HTA-Diabetes association had motivated the choice of this theme entitled: "Prevalence of arterial hypertension in diabetics in the internal medicine unit at the Fousseyni Daou Hospital in Kayes".

The objective was to study the epidemiological, clinical and therapeutic aspects of the HTA and Diabetes association at the Internal Medicine Unit at the Fousseyni Daou Hospital in Kayes.

## MATERIAL AND METHODS

This study was carried out in the Internal Medicine Unit at the Fousseyni Daou Hospital in Kayes.

This was a descriptive retrospective study lasting one (1) year from January 1 to December 31, 2019.

Included were type 1 or 2 diabetic and hypertensive patients aged 15 years and over, followed in an outpatient setting or hospitalized during the study period.

Non-hypertensive type 1 or 2 diabetic patients were not included.

Arterial hypertension was defined as a systolic blood pressure (SBP)  $\geq 140$  mmHg and/or a diastolic blood pressure (DBP)  $\geq 90$  mmHg during the consultation or a hypertensive patient under treatment.

Diabetes was diagnosed if fasting venous blood glucose (fasting = 8 to 10h)  $\geq 1.26$  g/l (7mmol/l)

The associated cardiovascular risk factors investigated in our study were:

- Age:  $>50$  years in men and  $>60$  years in women.
- Sedentary lifestyle: was defined by insufficient or no physical activity of our patients.
- Obesity: was defined by a body mass index between 35 and 39.9 kg/m<sup>2</sup>.
- Smoking: was defined for any patient who reported current or former smoking, expressed in number of packs per year.
- Alcoholism: was defined as any patient who declared having had, in the past or in the present, a daily consumption of at least three glasses of alcohol per day in men and two glasses per day in women.
- Dyslipidaemia: was defined by total cholesterolaemia  $\geq 2$  g/l (LDL-cholesterol  $> 1.6$  g/l, HDL-cholesterol  $< 0.4$  g/l, triglycerides  $> 1.5$  g/l).

## RESULTS

406 diabetic subjects were recorded including 157 cases of hypertension association, i.e. a prevalence of 38.67%. The age group of 50 -59 was the most affected, respectively 44.58% and the average age was 51 years with extremes of 29 - 82 years (See Figure 1).

The female sex predominated with 91 cases (57.96%) against 66 men (42.04%) with a sex ratio of 0.72 (See Figure 2).

According to origin, 102 patients (64.97%) lived in the urban area (city of Kayes) against 55 cases (35.03%) of patients who came from the rural area. Housewives predominated with 63 cases (40.13%). The majority of patients had type 2 diabetes with 155 cases 98.73% against 1.27% of type 1 cases (See Figure 3). Diabetes and hypertension evolved between 6 and 10 years in respectively 89 cases (56.68%) and 79 cases (50.32%) of our patients (See Table 1). The functional signs frequently encountered were headaches 105 cases (66.88%) dizziness 77 cases (49.04%); polyuria 40.76%; polydipsia 41.40%, weight gain (See Table 2). In 39 cases (24.84%) hypertension existed before the diabetes and was treated; in 83 cases (52.87%) it was discovered at the same time, in 35 cases (22.29%) it occurred later. Thus, in 122 cases out of 157, i.e. 77.71% of cases, hypertension preceded or was discovered at the same time as diabetes. Measurement of fasting blood sugar in our patients had shown 24.84% (39 cases) of normal blood sugar (0.8 and

1.20g/l); 70.06% (110 cases) of hyperglycaemia (glycaemia >1.26g/l) and 5.09% (8 cases) of hypoglycaemia (glycaemia <0.70 g/l) (See Figure 4).

Good glyceic control was reported in 40 patients (25.48%) versus 117 patients (74.52%) with poor glyceic control (See Figure 5).

The hypertension was grade 2 with 53 cases (33.75%) followed by grade 1 with 49 cases (32.51%) (See Table 3). The associated cardiovascular risk factors found were age > 50 years in men 43 cases (27.39%), and 60 years in women 55cases (35.03%); physical inactivity 99 cases (63.06%).

Peripheral neuropathy 98 cases (63.06%), hypertensive retinopathy 24 cases (15.19%), diabetic retinopathy 16 cases (10.19%) were the main complications found. (See Table 4).

The associated cardiovascular risk factors most frequently found in our study were physical inactivity (63.06%) and age > 50 years in men (27.39%) and > 60 years in women (35.03 %) (See Table 5).

The association of angiotensin-converting enzyme (IEC) and hydrochlorothiazide (HCT) (dual therapy) 67 cases (42.62%) represented the treatment of choice for hypertension in our patients followed by calcium channel blockers with 60 cases (38.21%) (See Table 6).

The lifestyle and diet alone or associated with drug treatment was recommended for all patients.

The combination metformin and sulfonamide was the treatment of choice for diabetes with 85 cases (54.14%) against 30 cases (19.11%) for metformin alone and 25 cases (15.92%) for insulin (See Table 6). Patients hospitalized for hypertension-diabetes were 22 in number, including: 6 cases of foot wounds (27.27%), 2 cases (9.09%) of ischemic stroke, 2 cases (9.09%) of MI, 2 cases (9.09%) of chronic renal failure.

The outcome of the hospitalization was marked 1 case of death (4.55%), 2 patients (9.09%) were referred to Bamako for dialysis, 19 patients (86.36%) were released improved.

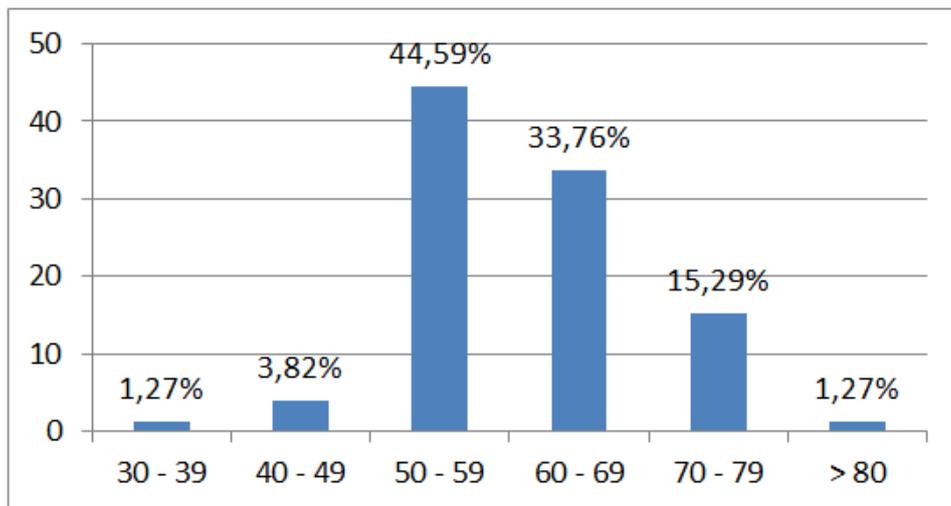


Figure 1: Distribution of patients according to age

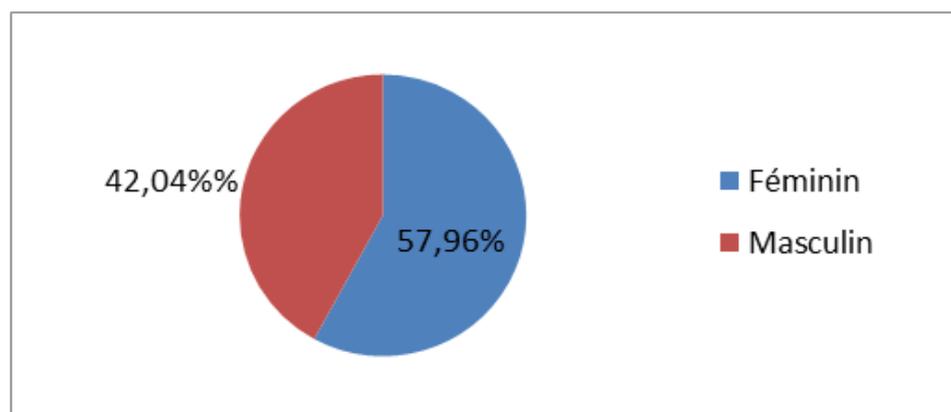


Figure 2: Distribution of patients by gender

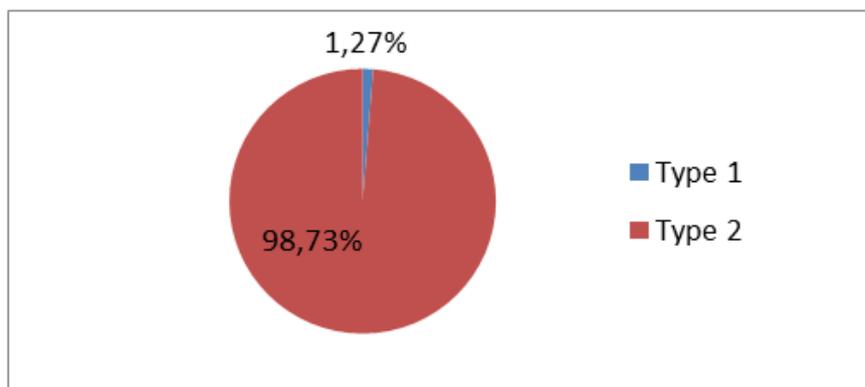


Figure 3: Distribution of patients by type of diabetes

Table 1: Distribution of patients according to duration of Diabetes/HTA progression

	Duration of change (years)	Number	Percentage
Diabetes	≤ 5	50	32,85
	6 à 10	89	56,68
	11 à 15	11	7,01
	16 à 20	5	3,18
	21 à 25	2	1,27
	Total	157	100
Arterial hypertension (HTA)	≤ 5	50	32,85
	6 à 10	79	50,32
	11 à 15	21	13,37
	16 à 20	5	3,18
	21 à 25	2	1,27
	Total	157	100

Table 2: Circumstances of clinical signs of hypertension/diabetes

	Clinical signs	Number n=157	Percentage
Arterial hypertension (HTA)	Headaches	89	56,69
	Vertigo	50	32,85
	ringing in the ear	11	7,01
	scotoma	5	3,18
	Palpitation	2	1,27
Diabetes	Polyuria	64	40,76
	Polydipsia	65	41,40
	polyphagia	60	38,21
	Overweight	5	3,18
	weight loss	2	1,27

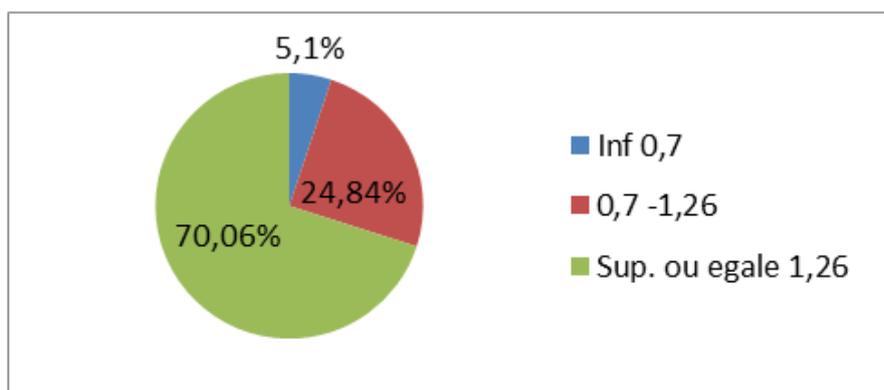
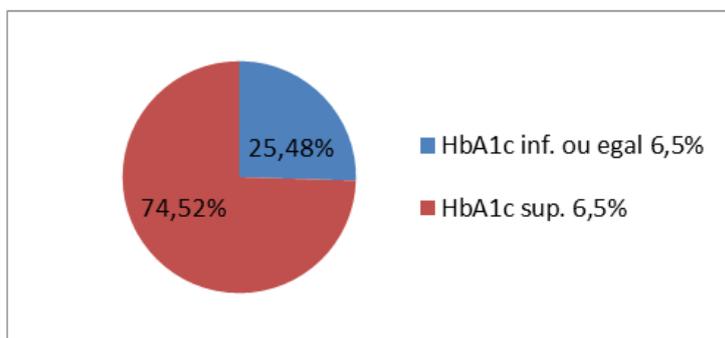


Figure 4: Distribution of patients according to the last glycemia



**Figure 5: Distribution of patients according to glycemic control (HbA1c)**

**Table 3: Distribution of patients according to hypertension grade**

Blood pressure categories (mmHg)	Number	Percentage
Optimal Blood pressure < 120/80	17	10,83
normal PAS: 120-129 and/or PAD: 80-84	11	7
normal high PAS: 130-139 and/or PAD: 85-89	21	13,38
Grade 1 hypertension PAS: 140-159 and/or PAD: 90-99	49	32,51
Grade 2 hypertension PAS: 160-179 and/or PAD: 100-109	53	33,75
Grade 3 hypertension PAS: ≥180 and/or PAD: ≥110	4	2,55
Isolated systolic hypertension PAS: ≥140 and/or PAD: 90	2	1,27
<b>Total</b>	<b>157</b>	<b>100</b>

**Table 4: Distribution of patients according to complications**

		Complications	Number n=157	Percentage
treble		Hypoglycemia	8	5,10
		Ketoacidosis	0	0
		Hyperosmolar	0	0
		Lactic acidosis	0	0
		diabetic wound	6	3,82
Degenerative	Microangiopathies	Nephropathy	5	3,18
		Diabetic retinopathy	16	10,19
		Hypertensive retinopathy	24	15,29
		Peripheral neuropathy	98	62,42
		Autonomic neuropathy	14	8,92
	Macroangiopathies	ischemic stroke	2	1,27
		Myocardial infarction (MI)	1	0,64
		Arteriopathy obliterans of the lower limb (PAD)	3	1,91
		Atherosclerosis	4	2,55
		Heart failure	2	0,64

**Table 5: Distribution of patients according to cardiovascular risk factors (CVDF)**

CVDF		Number n=157	Percentage
Age	> 50 years in men	43	27,39
	> 60 years in women	55	35,03
coronary heart disease		1	0,6
History of coronary artery disease		3	1,91
Sedentary lifestyle		99	63,06
Obesity		14	8,91
Smoking	Asset	3	1,91
	Weaned	11	7,01
Alcoholism	Asset	1	0,6

	Weaned	4	2,55
Dyslipidemia	HyperLDLemia ( $\geq 1.6$ g/L)	17	12,23
	HypoHDLemia ( $< 0.40$ g/l)	7	5,03
	Hypertriglyceridaemia ( $\geq 1.5$ g/l)	3	2,15

**Table 6: Breakdown of patients by treatment**

Treatments		Number n=157	Percentage
HTA	Low sodium diet (RHD) alone	5	3,18
	Calcium channel blocker +RHD	60	38,21
	ACE inhibitors + RHD	9	5,73
	Angiotensin II receptor antagonists (ARB II) +RHD	4	2,55
	Calcium channel blocker + Diuretic + RHD	2	1,27
	IEC + Diuretic + RHD	67	42,62
	ARA 2+Diuretic+RHD	7	4,46
	ARA 2+ Calcium channel blocker + Diuretic + RHD	3	1,91
Diabetic	Diabetic diet (RHD) alone	3	1,91
	Insulin +RHD	25	15,92
	Insulin + ADO + RHD	3	1,91
	Hypoglycemic sulfonamides +RHD	3	1,91
	Metformin +RHD	30	19,11
	Sulfonylurea – Metformin + RHD	85	54,14
	Sitagliptin +RHD	2	1,27
	Sitagliptin + metformin + RHD	3	1,91
	Vidagliptin + RHD	1	0,63
	Vidagliptin + metformin + RHD	2	1,27
Dyslipidemia	Atorvastatin	15	9,55
	Simvastatin	6	3,82
	Rosuvastatin	5	3,18
	Fibrates	1	0,63

## DISCUSSION

In our study, the frequency of the association of high blood pressure and diabetes was 38.67%. Diallo AAS *et al.*, [8] in Guinea; Sow D.S. *et al.*, [9] in Bamako; Coulibaly D. *et al.*, [10] in Bamako and Nouhoum O. *et al.*, [11] in Bamako respectively reported a frequency of 49%; 75%; 64.4% and 44.4%.

In our series, the age group of 50 -59 was the most represented with 44.58%. In the study by Diallo AAS *et al.*, [8] the most common age group was 58-67 years old, i.e. 34.5%. For Sow D.S. *et al.*, [9] 46.80% of patients were between 41 and 60 years old. Coulibaly D. [10] had found a proportion of 47.60% among 41 and 60 year olds. According to Nouhoum O. *et al.*, [11] the age group of 65-74 years represented 58%. The average age in our study was 51 years with extremes of 29 to 82 years. Diallo AAS *et al.*, [8] and Sow D.S. *et al.*, [9] found 60 years and  $60.44 \pm 10.29$  years respectively. The female sex was predominant in our series with 57.96% with a sex ratio of 0.72. Diallo AAS *et al.*, [8] showed a female prevalence of around 61% against 49% for males with a sex ratio of 0.64. For Sow D. S *et al.*, [9] women were in the majority 75% with a sex ratio of 0.33. Nouhoum O. *et al.*, [11] reported 56 women and 19 men. Koné B. [12] in his doctoral thesis in Medicine in Bamako had reported a clear

predominance of the female sex, i.e. 73.70% with a sex ratio of 0.36.

Housewives were the most affected with 40.13%. Diallo AAS *et al.*, [8] found 48.42% housewives.

During our study, 64.33% of our patients lived in the urban area of Kayes. Diallo AAS *et al.*, [8] found 89% of patients living in the urban area.

In our series diabetes evolved between 6 and 10 years in 56.68% of our patients. Sow D.S. *et al.*, [9] reported a duration of diabetes evolution of less than 10 years in 80.65% of patients and 19.35% in whom diabetes evolved for more than 10 years, Pour Nouhoum O *et al.*, [11] reported an evolution duration of less than 5 years in 64% of diabetics and 55% of hypertensives.

In our study 98.73% of patients had type 2 diabetes. Diallo AAS *et al.*, [8] had found 88.68% of type 2 diabetic patients

In our study the main functional signs were: for arterial hypertension: headaches: 56.69% and dizziness: 32.85% and for diabetes: polyuria: 40.76%, polydipsia: 41.40%, polyphagia: 38.21%. For Diallo

AAS *et al.*, [8] the functional signs were: headache: 63.9% dizziness: 63.9% followed by polyuro-polydipsic syndrome with 53%.

In our series, 122 patients out of 157, i.e. 77.71% of cases, hypertension preceded or was discovered at the same time as diabetes in 35 cases (22.29%) it occurred after. Diallo AAS *et al.*, [8] had 74.21% of hypertensive patients after diabetes and only 13.20% of hypertensives before the diagnosis of diabetes.

In our series, grade 2 hypertension represented 33.75% followed by grade 1 with 32.51%. For Nouhoum O *et al.*, [11] the patients had grade 1 (16%) grade 2 (15%) and grade 3 (10%) isolated systolic hypertension (28%). Koné B. [12] had found 32.1% of grade 1 hypertensive patients. Emmanuel M. N. [13] found a frequency of 19.6% of grade 3 hypertensives (severe hypertension) and 16.1% of grade 2 (moderate hypertension).

The associated cardiovascular risk factors most frequently found in our study were physical inactivity (63.06%) and age > 50 years in men (27.39%) and > 60 years in women (35.03%). Diallo AAS *et al.*, [8] had found age > 45 years (56.60%), sedentary lifestyle (13.20%) and obesity (13.20%). Nouhoum O *et al.*, [11] found 84% android obesity, 80% hyperuricemia, 77% dyslipidemia.

In our study, neuropathy dominated microangiopathic complications followed by hypertensive retinopathy 15.29% and diabetic retinopathy 10.19%. Diallo AAS *et al.*, [8] found 26 cases of hypertensive retinopathy. Sow D. S *et al.*, [9] found 52.81% neuropathy; 29.21% retinopathy and 16.85% nephropathy. Coulibaly D *et al.*, [10] reported 64.06% retinopathy; 43.15% neuropathy; 6.02% nephropathy, 8.22% stroke; 2.05% coronary artery disease; 4.79% AOMI.

In our series, 25.48% patients had good glycemic control against 74.52% poor glycemic control. Sow D. S *et al.*, [9] reported 41.94% good glycemic control. Coulibaly D *et al.*, [10] reported 10% good glycemic control. Nouhoum O *et al.*, [11] found 16% good glycemic control. Camara A *et al.*, [14] reported 37.6% good glycemic control.

The combination of ACE inhibitor (ACEI) + hydrochlorothiazide was the most frequently used antihypertensive in our patients 42.62% followed by the calcium channel blocker (amlodipine) 38.21%. For Diallo AAS *et al.*, [9] the use of IEC represented 53.45% and treatment with oral antidiabetics was found in 56.60% of patients against 33.92% of patients who were on insulin. Coulibaly D *et al.*, [10] had found an antihypertensive combination in 45.20% of patients. Nouhoum O *et al.*, [11] found 53/75 (70.66%) cases of

monotherapy and 22/75 (29.33%) cases of dual therapy or more. According to Emmanuel M. N. [13] the antihypertensive protocol used was 44.1% dual therapy, 38.2% monotherapy, 17.7% triple therapy and the antidiabetic treatment was mainly 97% monotherapy and 3% dual therapy.

Patients hospitalized for hypertension-diabetes were 22 in number, including: 6 cases of foot wounds (27.27%), 2 cases (9.09%) of ischemic stroke, 2 cases (9.09%) of MI, 2 cases (9.09%) of chronic renal failure. The outcome of the hospitalization was marked 1 case of death (4.55%), 2 patients (9.09%) were referred to Bamako for dialysis, 19 patients (86.36%) were released improved. Diallo AAS *et al.*, [9] reported 12 patients hospitalized for hypertension-diabetes, with 6 cases of death (50%), 2 patients (16.67%) were referred to the specialized department and 4 patients (33.33%) discharged improved.

## CONCLUSION

The hypertension-diabetes association exposes patients in the long term to sometimes serious complications, hence the need for early screening and management of these two cardiovascular risk factors. Primary prevention and non-pharmacological treatment of these two conditions should therefore be strengthened, namely: regular physical exercise, the fight against obesity, a better nutritional balance with a reduction in the intake of sugar, lipids and salt.

### The limitations of the study:

- Retrospective study in which the collection of data came from the medical records of patients seen in consultation or hospitalized, which were often incompletely filled out, were eliminated (52 records).
- The high cost of additional examinations for uninsured patients, hence the exclusion of many patients.
- The limited sampling and the short duration of the study.

**Conflicts of Interest:** The authors declare no conflict of interest.

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