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Blood Pressure Profile and Glycemic Control of Type 2 Diabetics and Hypertensives at the Yalgado Ouedraogo University Hospital: A Review of 116 Cases

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Abstract

Objective: The association hypertension and diabetes is important. The two pathologies may influence each other. The aim was to study the correlation between glycemic control and blood pressure control and to determine the factors associated with blood pressure control. **Methodology:** This was a descriptive cross-sectional study with an analytical focus over 7 months. Patients were recruited as outpatients and all underwent ambulatory blood pressure measure, glycated hemoglobin and creatinine measurements, and assessment of compliance with treatment. **Results:** During this period 116 patients were collected. The predominance was female 69%. The mean age of the patients was 62 ± 7 years with a peak between 60 and 70 years. The average age of hypertension was 12 years and that of diabetes 6 1/2 years. The most frequently associated cardiovascular risk factor was a sedentary lifestyle (71.5%) after age. 57.8% of patients were not controlled at the office, with a predominance of systolic hypertension (58.2%). 61.6% of patients were controlled by ambulatory blood pressure measure, a rate of 47.8% of white coat hypertension. Glycemic control was observed in 42.2% of cases and 87% of patients had good renal function (glomerular filter rate ≥ 60 ml/mn). Therapeutic compliance was good in 53.4% of cases and dual therapy was the most used therapeutic modality 44.8% (52 patients) followed by triple therapy. The factors associated with poor blood pressure control were glycemic imbalance, non-compliance and monotherapy. Dual therapy had a protective effect. **Conclusion:** The association of hypertension and type 2 diabetes is frequent. The risk of occurrence increases with age. Ambulatory blood pressure measure is the best method to assess blood pressure control. Optimization of blood pressure control should also include optimization of glycemic control.

Keywords

Blood Pressure Control, Glycemic Control, Hypertensive and Diabetic Patients

1. Introduction

Hypertension and diabetes represent two major public health problems. According to the WHO, 45% of deaths from heart disease and 51% of deaths from stroke are attributable to hypertension [1]. The International Diabetes Federation (IDF) predicts that there will be 700 million diabetics (9.9% of the world's population) with four (04) million deaths due to diabetes and its complications by 2045 [2]. Africa has the highest prevalence of hypertension in the world, with 46% of adults aged over 25 affected, and the highest rate of undiagnosed diabetes, resulting in high morbidity and mortality [3]. These two diseases are frequently associated, with the prevalence of hypertension reaching 80% in type 2 diabetes [3] [4]. In the PROCAM study [5] of 4043 men and 1333 women aged between 50 and 65, the prevalence of hypertension (PAS > 160 mmHg) in diabetic subjects was 50%. In the UKPDS study [5], 39% of type 2 diabetics had hypertension > 160/90 mmHg. This prevalence is much higher in African regions. Fennoun *et al.* [6] in Morocco in 2018, Diallo *et al.* [7] in Guinea in 2018, Mbaye *et al.* [8] in Senegal in 2011, Codjo *et al.* [9] in Benin in 2016 reported a prevalence of hypertension of 78.9%, 49%, 87.8% and 60% respectively.

In Burkina Faso, there is very little data on the association of hypertension and type 2 diabetes. Zabsonré *et al.* in 1998 (hypertension > 160/90 mm Hg) found a prevalence of 46.2% [3]. Guira and *et al.* [10] in 2016, in a study of the clinical profile of metabolic syndrome and factors associated with its presence in type 2 diabetes in Ouagadougou, showed that hypertension is the main component of metabolic syndrome, with a prevalence of 89.6%.

There are no studies on the impact of glycaemic profile on blood pressure control in our context. However, the association of hypertension and diabetes makes blood pressure control extremely difficult because of the many pathophysiological mechanisms underlying this association. Data in the literature [11] [12] show that less than a third of hypertensive diabetic patients have their blood pressure controlled, and compliance with treatment is thought to be halved within a year. In addition to the above factors, hypertension in sub-Saharan Africans is accompanied by greater fluid and sodium retention, associated with low plasma renin, making blood pressure control more difficult in these patients [13] [14]. The aim of our work is to study the relationship between blood pressure control and glycaemic control in patients with type 2 diabetes and hypertension.This study will provide a better understanding of the difficulties of blood pressure control in patients with type 2 diabetes, with a view to substantially improving patient management.

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2. Patients and Method

The study was conducted in the cardiology department of the CHU-Yalgado Ouedraogo. This was a descriptive cross-sectional study with analytical aims over a period of 7 months, from 1st April to 31 October 2021. The patients selected were those seen for consultations or paraclinical investigations with a definite diagnosis of hypertension and type 2 diabetes and who had been on treatment for at least 3 months. Patients with one or more of the following conditions were not included in the study: chronic renal failure with a GFR < 30, renal artery stenosis, coarctation of the aorta, long-term anti-inflammatory treatment, pregnant women, hyperthyroidism, patients with a rhythm or conduction disorder. The sample size was calculated with Open Epi software for unmatched case-control study. The value used for calculation were the confidence level of 95%, power of 80%, percentage of controlled hypertension of 49.6%, odd ratio of 0.31 and diabetic with hypertension controlled of 23.3%%. The sample size generated was 120 patients.

Data collected for the study were socio-demographic data, clinical data, glycaemia, complications, ambulatory blood pressure measure and treatment compliance.

The data were analysed using Stata/MP 15.1 software. Patient characteristics were described by their numbers and percentages surrounded by their confidence intervals for qualitative variables. Quantitative variables were described by their means and medians and their dispersion parameters, respectively the standard deviation and the interquartile range (IQR). In exploring cases of association between categorical qualitative variables, a Chi2 test will be performed to compare the different proportions. To study the association between blood pressure and socio-economic, biological and clinical characteristics, logistic regression was used. Variables with a p-value in the univariate model of <0.20 were included in the multivariate model. Since monotherapy and dual therapy were associated variables, we included in the multivariate model the variable with the lowest p-value.

Operating definitions

A diabetic patient was any patient whose diagnosis was clearly mentioned in the diary or on the report card and who was on anti-diabetic treatment.

Type 2 diabetes is said to be balanced if the value of glycated haemoglobin is less than 7% [13]. In our study, it was said to be balanced if the glycated haemoglobin was less than or equal to 7%, or the fructosamine less than or equal to 317 µmol/l.

A hypertensive patient was any patient whose diagnosis was clearly mentioned in the diary or on the examination report and who was on antihypertensive treatment.

Hypertension was considered to be controlled in the office if the systolic blood pressure and diastolic blood pressure were below 140/90 mmHg.

Hypertension was said to be controlled at ABPM if the mean value of the SBP and DBP were strictly less than: 135/85 mmHg during the day; 120/70 mmHg at night or 130/80 mmHg for all 24 hours.

Pulse pressure was defined as the difference between mean SBP and DBP over 24 hours.

3. Results

Sociodemographic characteristics

Our population was predominantly female, with 80 women and 36 men, giving a sex ratio of 0.5. The mean age of our patients was 62 ± 7 years, with extremes of 33 and 98 years. Housewives were the most common occupational group (36.2%), ninety-four percent (94%) lived in urban areas, and more than half the patients had a low socio-economic status (54.3%). The majority of patients (42.2%) had hypertension and diabetes for less than 10 years. The mean age of the hypertension was 144 months (12 years), with extremes of 4 and 552 months. The mean age of diabetes was 78 months (6 years 6 months) with extremes of 4 and 360 months. Physical inactivity was the most frequent cardiovascular risk factor after age in 71.5% of cases. A family history of hypertension was most frequently found in 54 patients (46.6%).

Clinical data

In-office clinical data

Measurement of BP in the practice revealed 49 controlled patients (42.2%) and 67 uncontrolled patients (57.8%). Systolic hypertension was most frequently found in 58.2% of cases. In 67.2% of cases it was grade 1 hypertension.

ABPM data

Good control of daytime BP was observed in 82 patients (70.7%) and 38.9% of patients had well-controlled nocturnal BP. Good control of 24-hour BP was observed in 71 patients (61.2%). Uncontrolled patients had predominantly daytime systolic hypertension and predominantly nocturnal systolo-diastolic hypertension (17.3% and 35.3% respectively). Of the 49 patients monitored in hospital, ten (10) were not monitored by ABPM, *i.e.* a masked hypertension rate of 20.4%, and of the 67 patients not monitored in hospital, almost half (32) were monitored by ABPM, *i.e.* a white coat hypertension rate of 47.8%. Kendall's coefficient of agreement between these two methods was 0.3227. The mean pulse pressure of the patients was 52.92 mmHg with extremes between 35.7 and 79 mmHg. It was ≤60 mmHg in 90 patients (77.6%). More than 2/3 of our patients had a non-significant nocturnal physiological fall in blood pressure (BP) and in 14.6% of cases we observed a nocturnal rise in BP (Table 1).

Paraclinical data

Analysis of glycated haemoglobin data showed that 49 patients (42.2%) were well controlled and 67 patients (57.8%) were not. In 87.1% of cases (101 patients) the GFR was ≥60 ml/min and in 12.9% of cases (15 patients) the GFR was between 30 and 60 ml/min.

Data on antihypertensive treatment

Of the 116 patients surveyed, 62 (53.4%) were compliant and 54 (46.6%) poorly compliant (Figure 1). The most commonly used treatment modalities were dual therapy and triple therapy in 52 and 29 patients respectively. Half (50%) of the patients on dual therapy were taking a combination of ACE inhibitor and ICR. Target organ damage was dominated by cardiac damage (36%), followed by ocular damage (10.3%).

Table 1. Patients distribution according to ABPM data.

ABPM	Frequency	Percentage (%)
Diurnal		
Controlled hypertension	82	70.7
Systolic hypertension	20	17.3
Diastolic hypertension	4	03.4
Systolic-diastolic hypertension	10	08.6
Nocturnal		
Controlled hypertension	45	38.9
Systolic hypertension	17	14.6
Diastolic hypertension	13	11.2
Systolic-diastolic hypertension	41	35.3
For 24 hours		
Controlled hypertension	71	61.2
Systolic hypertension	21	18.1
Diastolic hypertension	5	04.3
Systolic-diastolic hypertension	19	16.4

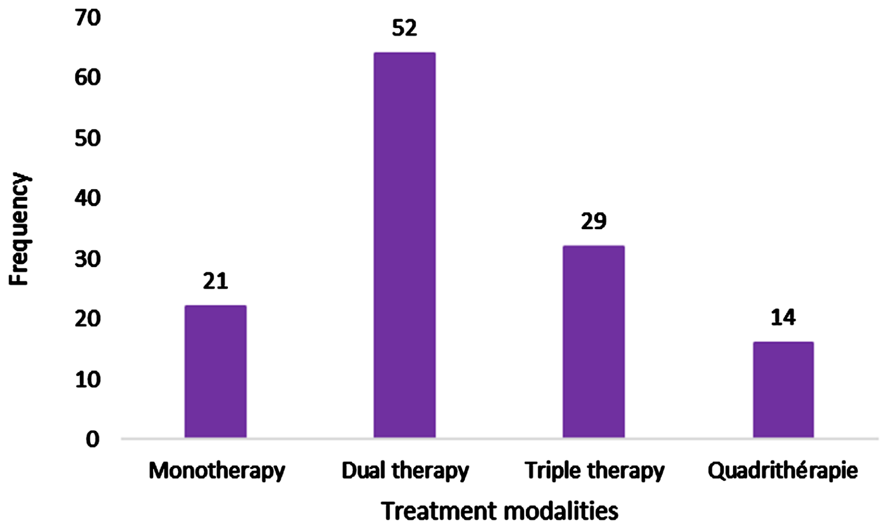

Figure 1. Distribution of patients by therapeutic modality.

Factors associated with blood pressure control

Factors associated with daytime BP control

Univariate analysis showed a significant association between daytime BP control and glycaemic control (p = 0.015), compliance with treatment (p = 0.037), obesity (p = 0.016) and fixed dual therapy (p = 0.045) (Table 2). The probability of developing uncontrolled daytime BP was 2.8 times higher when HbA1c was greater than 7% than when it was less than or equal to 7%. Similarly, the probability of having uncontrolled daytime BP was 2.4 times higher in non-adherent patients than in adherent patients, and 2.71 times higher in obese patients (BMI ≥ 30 kg/m^2) than in non-obese patients. With fixed dual therapy, the risk of uncontrolled daytime BP was 2.4 times lower. Fixed dual therapy reduced the risk of uncontrolled daytime BP.

In multivariate analysis (Table 3), there was a significant association between HbA1c strictly above 7% and poor control of daytime BP. This association was reflected in a 2.9-fold higher probability of having uncontrolled daytime BP when HbA1c was strictly greater than 7%, compared with patients with a glycated HbA1c of less than or equal to 7%. As for dual therapy, there was a significant link with daytime blood pressure control, which translated into a reduced risk of uncontrolled daytime blood pressure.

Factors contributing to poor control of nocturnal BP

Univariate analysis showed a significant association between nocturnal BP control and dual therapy (p = 0.047). In fact, the risk of having uncontrolled nocturnal BP was 2.17 times lower when a patient was on dual therapy than when he or she was not (Table 4).

The results of the multivariate analysis showed a significant association (p = 0.048) between control of nocturnal BP and combination therapy. In fact, the risk was 2.2 times lower (1/0.456) for a patient on dual therapy to have uncontrolled nocturnal BP (Table 5).

Table 2. Data from the univariate analysis of factors associated with daytime BP control.

Variables	Number of patients	Uncontrolled hypertension (%)	Odds Ratio	95% CI	p Value
Sex					0.526
Women	80	27.5			
Men	36	33.3	1.31	(0.563; 3.080)	
Socioeconomic level					0.472
Low	63	31.7			
Intermediate	49	24.5	0.697	(0.301; 1.61)	
High	4	50.0	2.15	(0.282; 16.38)	
Age as CRF					0.68
No	23	26.1			
Yes	92	30.4	1.239	(0.442; 3.470)	
Sedentary lifestyle					0.587
No	32	25.0			
Yes	83	30.1	1.293	(0.511; 3.260)	
Obesity (BMI)					**0.016**
No	74	21.62			
Yes	42	42.86	2.71	(0.216; 23.40)	
Abdominal Obesity					0.362
No	77	25.97			
Yes	38	34.21	1.482	(0.638; 3.439)	
Alcohol					0.944
No	98	28.57			
Yes	17	29.41	1.041	(0.336; 3.200)	
HbA1c (%)					**0.015**
≤7	54	18.52			
>7	56	39.29	2.847	(1.191; 6.804)	
Fasting glycaemia					0.763
≤6.5	43	27.92			
>6.5	72	30.56	1.137	(0.494; 2.61)	
Normal GFR					0.81
No	15	26.67			
Yes	101	29.70	1.162	(0.342; 3.940)	
Therapeutic compliance					**0.037**
Good	62	20.97			
Bad	54	38.89	2.398	(1.056; 5.440)	

Continued

Monotherapy					0.137
No	95	26.32			
Yes	21	42.86	2.100	(0.790; 5.580)	
Dual therapy					**0.045**
No	65	36.92			
Yes	51	19.61	0.417	(0.177; 0.980)	

Table 3. Data from multivariate analysis of factors associated with daytime BP control.

Variables	Odds Ratio	95% CI	p Value
HbA1c > 7%	2.906	(1.155; 7.300)	**0.023**
Dual therapy Yesi	0.357	(0.139; 0.919)	**0.03**
Therapeutic compliance	2.119	(0.868; 5.170)	**0.09**

Table 4. Results of univariate analysis of factors associated with nocturnal BP control.

Variables	Number of patients	Uncontrolled hypertension (%)	Odds Ratio	95% CI	p value
Sex					0.670
Women	80	27.50%			
Men	36	33.33%	0.84	(0.376; 1.870	
Socioeconomic level					0.373
Low	63	31.75			
Intermediate	49	24.49	1.65	(0.759; 3.580)	
High	4	50	2.4	(0.236; 24.35)	
Age as CRF					0.701
No	23	26.09		(0.319;	
Yes	92	30.43	0.829	2.150)	
Sedentary lifestyle					**0.0581**
No	32	25			
Yes	83	30.12	2.226	0.971; 5.10)	
Obesity (BMI)					0.907
No	74	21.61			
Yes	42	42.86	1.047	(0.12; 5.690)	
Abdominal Obesity					0.647
No	77	25.97			
Yes	38	34.21	0.830	(0.376; 1.83)	
Alcohol					**0.04**
No	98	28.57			
Yes	17	29.41	3.499	(0.945; 12.96)	

Continued

HbA1c (%)					
≤7	54		1.145	(0.528; 2.48)	0.73
>7	56				
Fasting glycaemia					0.858
≤6.5	43	27.92			
>6.5	72	30.56	0.931	(0.427; 2.02)	
GFR					0.64
[30 - 60[	15	26.67			
≥60	101	29.31	0.762	(0.230; 2.39)	
Therapeutic compliance					0.457
Good	62	20.97			
Bad	54	38.89	1.330	(0.627; 2.82)	
Monotherapy					0.109
Yes	21	42.86			
No	95	26.32	2.327	(0.787; 6.87)	
Dual therapy					**0.047**
No	65	36.92			
Yes	51	19.61	0.460	(0.627; 2.820)	

Table 5. Results of multivariate analysis of factors associated with nocturnal BP control.

Variables	Odds Ratio	95% CI	p-Value
Alcohol: Yes	3.365	(0.893; 12.6)	0.073
Dual therapy: Yes	0.456	(0.209; 0.99)	**0.048**
Sedentary lifestyle: Yes	2.383	(0.997; 5.692)	0.051

Factors associated with 24-hour blood pressure control

The data from the univariate analysis showed a significant link between 24-hour BP control and glycaemic control (p = 0.045), monotherapy (p = 0.018) and therapeutic compliance (p = 0.021). The risk of having an uncontrolled mean 24-hour BP was 2.4 times higher in patients with a glycated haemoglobin of over 7% than in those with a haemoglobin of 7% or less. It was 3.2 times higher in patients on monotherapy. Finally, it was 2.4 times higher in non-adherent patients (**Table 6**). Multivariate analysis showed that having an HbA1c strictly greater than 7% was significantly associated with 24-hour BP control, as was being on monotherapy or having poor compliance. The risk of having uncontrolled 24-hour BP was 2.4 times higher in patients whose HbA1c was strictly greater than 7%, 3.3 times higher in patients on monotherapy and 2.1 times higher in patients with poor compliance (**Table 7**).

Table 6. Data from univariate analysis of factors associated with 24-hour BP control.

Variables	Frequency	Uncontrolled hypertension (%)	Odds Ratio	95% CI	p value
Sex					0.67
Women	80	27.50%			
Men	36	33.33%	1.19	(0.534; 2.657)	
Socioeconomic level					0.807
Low	63	36.51			
Intermediate	49	40.82	1.199	(0.557; 2.581)	
High	2	50	1.739	(0.229; 13.188)	
Age as CRF					0.343
No	92	47.83			
Yes	23	36.96	0.639	(0.254; 1.606)	
Alcohol					0.183
No	98	35.71			
Yes	17	52.94	2.025	(0.717; 5.718)	
HbA1c					**0.045**
≤7 g	53	29.63			
>7%	57	48.21	2.445	(1.108; 5.399)	
Sedentary lifestyle					0.332
No	32	31.25			
Yes	83	40.96	1.526	(0.642; 3.629)	
Fasting glycaemia (mmol/l)					0.945
≤6.5	43	39.53			
>6.5	72	38.89	0.973	(0.449; 2.109)	
GFR (ml/mn)					0.095
[30 - 60[	15	20.0			
≥60	101	41.58	2.847	(0.756; 10.516)	
Monotherapy					**0.018**
No	92	33.68			
Yes	23	61.90	3.199	(1.203; 6.508)	
Dual therapy					0.144
No	65	44.62			
Yes	51	31.37	0.567	(0.263; 1.222)	

Continued

Therapeutic compliance					**0.021**
Good	62	29.03			
Bad	54	50.0	2.444	(1.137; 5.253)	
Obesity					**0.06**
No	74	32.43			
Yes	21	50.0	2.083	(0.958; 4.528)	

Table 7. Multivariate analysis of factors associated with 24-hour blood pressure control.

Variables	Odds Ratio	95% CI	p Value
HbA1c > 7	2.388	(1.023; 5.572)	0.045
Monotherapy Yes	3.306	(1.155; 9.463)	0.018
Bad therapeutic compliance	2.091	(0.913; 4.782)	0.021

4. Discussion

Our study investigated the correlation between blood pressure control and glycaemic control in patients with type 2 diabetes and hypertension. However, this was a cross-sectional study which did not allow causal factors to be identified, but rather factors of association. Compared with large-scale international studies, we have a small number of patients. In the UKPDS study, out of 5102 patients enrolled, 3834 type 2 diabetic patients were examined [15]. Although our study enabled us to describe the blood pressure profile of hypertensive type 2 diabetics and to determine the factors associated with poor blood pressure control, a larger cohort study would certainly provide more information and enable us to identify other factors associated with blood pressure control in hypertensive type 2 diabetics [16].

In our study, there was a predominance of women, with 80 (69%) women and 36 (31%) men; this predominance of women has been found by other authors, including El-Aassri and *et al.* [17]; Ngendakumana and *et al.* [18], Diyanne and *et al.* [19]. In addition to the demographic predominance of women in Burkina Faso, our results can be explained by the greater frequency with which women attend health facilities, as reported in data from the National Statistics and Demography Institute [20]. Finally, women are more sedentary than men, and sedentary lifestyles are a factor in the development of hypertension and diabetes [16]. The mean age of our patients was 62 ± 7 years, with the 60 - 70 age group being the most common. This result is close to that of other authors: Ngendakumana and *et al.* [18] in Morocco, Ben-Hamouda-Chihaoui *et al.* [16], Diyanne *et al.* [19] au Maroc, Ikama *et al.* [21] in Congo found a mean age of 60 ± 7 years, 61.2 ± 9.1 years, 57.9 ± 12 years, and 51.7 ± 10.6 years respectively. This result can be explained by the frequency of occurrence of these two diseases, which increases with age, peaking between 66 and 69 years of age [9].

L'ancienneté moyenne de l'HTA était de 143,58 mois (~environ 12 ans) avec des extrêmes de 4 et 552 mois et l'ancienneté moyenne du diabète était de 78,37 mois (environ 6 ans 6 mois) avec des extrêmes de 4 et 360 mois. Ce résultat diffère de celui de Diyanne and *et al.* [19] who found a mean age of 7.2 ± 6.5 years for hypertension and 10.5 ± 6.7 years for diabetes. This difference could be explained by our study settings. The latter had conducted their study in a diabetology department and we in a cardiology department.

Data on office BP measurement show that 57.8% of patients are uncontrolled. This finding has been reported by other authors such as Yaméogo and *et al.* [22] in Burkina Faso, El Aassri [17] in Tunisia, Ngendakumana and *et al.* [18] in Morocco who found respectively 54.2%, 59% and 61.23% of uncontrolled patients in their series. Yaméogo and *et al.* [22] found several factors associated with poor BP control: age greater than or equal to 60 years, low socio-economic status, high to very high cardiovascular risk, anti-hypertensive monotherapy, duration of treatment greater than or equal to ten years and failure to comply with treatment. Uncontrolled patients had predominantly systolic hypertension in 58.2% of cases. Our results are similar to those of El-Aassri and *et al.* [17] who found predominant systolic hypertension in 59%. Furthermore, according to the literature [23] the most frequent type of hypertension is essentially systolo-diastolic; isolated systolic hypertension may also be observed, with higher blood pressure figures which may be a more predictive factor of cardiovascular events than in systolo-diastolic hypertension. Finally, in diabetic patients, arterial stiffness may transform systolo-diastolic hypertension into purely systolic hypertension [24]. The majority of patients (61.2%) were monitored using ABPM, compared with 42.2% of patients monitored in the office. The concordance rate (Kendall's tau-b) was 32.27%. Our results differ from those of other authors such as Ngendakumana and *et al.*, [18], Ben-Hamoudi-chihaoui [16] who found a concordance rate of 82.65% and 70.3% respectively. This low concordance rate is explained by the high rate of white-coat hypertension, which was 47.76% in our study and 16.4% in their study. Screening for cases of white-coat hypertension and masked hypertension confirms the value of ABPM, especially as the majority of patients not screened at the practice had predominantly Grade I hypertension. In fact, according to the recent 2021 guidelines on BP measurement, it is strongly recommended that self-measurement of BP (SMBP) or ABPM be performed because of the increased likelihood of white coat hypertension when BP is in the range of Grade I hypertension; similarly, when BP is normal (130 - 139/80 - 89 mmHg) there is a high likelihood of masked hypertension [25] [26] [27] [28].

Glycaemic control (HbA1c ≤ 7%) was observed in 49 (42.2%) patients. Our results differ from those of Farouqui and *et al.* [29], Diyanne and *et al.* [19] who found respectively 30.9% and 4.2% of type 2 diabetic patients in control in their series. This difference could be explained by our HbA1c threshold values. In fact, it was strictly less than 7% in the series by Farouqui and *et al.* [29] and less than or equal to 6.5% in the series by Diyanne and *et al.* [19].

Dual antihypertensive therapy was the most commonly used therapeutic modality (44.38%). Our results are close to those of Fenoun and *et al.* [6] in Morocco who also found a majority of patients (53%) on this dual therapy. Indeed, according to the ESC 2018 recommendations [30], fixed dual therapy is recommended as first-line therapy in diabetic hypertensive patients. Univariate analysis identified the following factors as contributing to poor blood pressure control: unbalanced diabetes, obesity, non-compliance with treatment, monotherapy and alcohol consumption. In the study by Yaméogo and *et al.* [22] involving a population of hypertensive patients, in addition to the above-mentioned factors of poor BP control, age greater than or equal to 60 years, low socioeconomic status, high to very high cardiovascular risk, and duration of treatment greater than or equal to ten years were also implicated [22] [31]. Our study focused on a specific group of patients, namely diabetic hypertensives.

The various multivariate analyses in our study showed that a glycated haemoglobin level strictly above 7% was significantly associated with poor blood pressure control. In fact, the risk of having uncontrolled blood pressure was at least twice as high when diabetes was unbalanced as when it was not. There are few data on the correlation between glycaemic control and blood pressure control. El Zouak [32] found that diabetes mellitus was a factor in poor blood pressure control. This could be explained by insulin resistance and hyperglycaemia, which leads to an increase in oxidative stress resulting in sympathetic hyperactivity. Chronic hyperglycaemia also causes damage to vascular walls, leading to an increase in peripheral resistance. It is important to ensure both good glycaemic control and good blood pressure control, as demonstrated by the results of the UKPDS study, which suggest that intensive glycaemic control from the onset of type 2 diabetes is associated with a reduced risk of myocardial infarction and all-cause mortality [33].

5. Conclusion

Hypertension is frequently associated with type 2 diabetes. ABPM is a better alternative for diagnosing and monitoring hypertension in diabetic patients. Factors contributing to poor blood pressure control include glycaemic imbalance, monotherapy and non-compliance with treatment. To reduce the risk of cardiovascular and cerebrovascular events, good blood pressure and glycaemic control are equally important. Good adaptation of therapies is also necessary. Priority should therefore be given to dual therapy, and therapeutic education should remain a major challenge, particularly as regards reducing sodium and sugar intake, regular physical activity and long-term compliance with treatment.

Conflicts of Interest

The authors declare no conflict of interest.

Authors' Contributions

All authors have read and approved the final version of the manuscript.

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