RESEARCH ARTICLE

Special features of the Ambulatory measure of the blood pressure (MAPA) in diabetic subjects

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Manuscript Info	***Abstract***

The association arterial high blood pressure (HTA) and diabetes is frequent. It potentiates the risk of death and cardiovascular complications. Therefore, a good diagnosis of HTA and its control is very important. The purpose of our study is to show the contribution of the ambulatory measure of the blood pressure and the particularities of diabetic patients with high blood pressure. It is about a forward-looking study over a period of one year, having concerned 100 diabetic patients with high blood pressure, and 100 non diabetic patients with high blood pressure, followed up the cardiology service at the Military Hospital AVICENE of Marrakesh. The average age of our diabetic patients was 57,79 ± 7,9 years old, with a sex-ratio of 1,08 against 49,60 ± 10,8 years, and a sex-ratio of 1,43 for the non diabetic patients. The MAPA allowed to objectify an unbalanced HTA for 66 diabetic patients, against 80 unbalanced patients by the clinical measure, and 16 patients balanced by MAPA against 20 patients considered well-balanced by clinical measure, with a rate of concordance between MAPA and clinical measure of 80 %, coefficient kappa of 0,77. While in the group of obvious non diabetics, the MAPA showed that 72 patients were unbalanced against 74 according to the clinical measure, and 28 patients balanced according to the MAPA against 26 according to the clinical measure, with a rate of 72 % concordance and a coefficient kappa of 0,55. The significant contribution of MAPA allowed him to occupy a prominent place in the treatment of hypertension in diabetic or not. Despite the cost of this technique, its use should be common practice.

INTRODUCTION

High blood pressure (HTA) and type 2 diabetes (T2D) is often associated. Methods of the arterial pressure measures have advanced considerably over time because more than 50% of diabetics over 45 years are hypertensive [1]. Therefore, a proper diagnosis of hypertension and control is of paramount importance, not to mention other cardiovascular risk factors.

The MAPA has become over time a major element in addition to the occasional arterial pressure measurement, compared to conventional arterial pressure measurement. It also assists in therapeutic decision and assesses the effectiveness of a treatment [2].

However, the level of blood pressure with diabetes is far from optimal, as evidenced by the ENTRED study (National Control Sample representative of diabetic people) showing that less than 15% of diabetic hypertensive reaches the objectives [3]. The occurrence of hypertension (HTA) has not the same meaning in all diabetic. In type II diabetes that handles 90% of diabetics, hypertension settled at an earlier stage and part of the metabolic syndrome often before the onset of diabetes [4].

Materials and methods

This is a prospective study over a period of one year, which involved 100 hypertensive patients with diabetes and 100 no diabetic hypertensive patients monitored in cardiology consultation with the Military Hospital Avicene of Marrakech. Were included in this study: Diabetic patients defined according to the American Diabetes Association (ADA) **[5]**; and hypertensive according to the recommendations of the French Society of hypertension **[6]**; All patients whose medical records were not usable or refusing to participate in the study were excluded; Data were collected from the consultation files , using a reporting sheet

The Monitoring was carried out by a Model Spacelab 90207 apparatus at the rate of one measurement every 15 minutes during the day and every 30 minutes at night. Quantitative data are expressed as mean ± standard deviation and compared by the student's test, while the qualitative data are expressed as numbers and percentages and compared by the chi 2 test. A p value < 0.05 was considered significant. The results were obtained using SPSS software Biostatistics.

Résultats

Over a period of one year (2014), 200 cases were reported in this study divided into two groups, with and without diabetes. The average age of the first group was 57.79 ± 7.9 years [35-80] with a median of 57 years, while in the second group, the average age of 49.60 ± 10.8 years 24 in the group of diabetic patients the sex ratio is 1.08 against 1.43 in the group of non-diabetic patients. Associated cardiovascular risk factors are, smoking, dyslipidemia, android obesity, age > 55 years android obesity in men and > 65 in women.

Table I: the associated cardiovascular risk factors

Cardiovascular risk factors	diabetic patients	Nodiabetic patients	P
Tabagisme	34%	24%	0,02
Dyslipidémie	24%	18%	0,01
android obesity,	60%	54%	0,007
men > 55 ans	47%	34%	0,03
women > 65 ans	16%	11%	0,01

In the group of patients with diabetes, the ischemic heart disease was more frequent than other backgrounds.

In the group of patients without diabetes, stroke cerebreaux and Transient ischemic attacks were more important than other backgrounds

In the group of diabetic patients, 48% were asymptomatic and 26 % had neurosensory signs of hypertension (HTA). Against 19% of asymptomatic patients and 50% with neurosensory signs of   hypertension without diabetes

In reviewing 40 % of diabetic patients had grade 1 hypertension (HTA) , 29% hypertension grade 2 and 31% hypertension grade 3   against , 57% , 27 %, 16 % for non- diabetics, P = NS . While cardiovascular examination was normal in 90% of diabetics, versus 98% for non-diabetics. The fundus 21% of diabetic patients was pathological, against 11 % for non- diabetics. The electrocardiogram ECG 54% of diabetics was normal, versus 88 % for non- diabetic patients.

Dyslipidemia, the microalbuminuria and proteinuria of 24 h were biological parameters most frequently disrupted in both groups; uric acid and anemia come in the second. The trans- thoracic ultrasound was performed in 69 diabetic patients, 10 of them had a Pathological transthoracic echocardiography. While 39 non-diabetic patients have realized, 4 of them had a pathological ultrasound

In diabetic subjects, 66% of MAPA showed an unbalanced HTA, against 72% of non-diabetic subjects with P < 0.02. In both groups of our series, the overall average of blood arterial pressure 24 h , day time and night , were higher than normal , the systolic loads were more important than diastolic loads. The average pulse pressure was 63.14 mmHg ± 16.5 mmHg,

The average systolic and diastolic dipping physiological was 5.58% ± 6.86 % and 6.26% ± 8%, in the group of diabetic patients, whereas in non-diabetics, the average pulse pressure was 56 mmHg ± 10,4mmHg, the average systolic and diastolic dipping physiological was 6.26% ± 8% and 11.21% ± 7.9%.

Table II: Comparison of functional signs of patients

symptomatology	diabetic%	No diabetic%	P
asymptomatic	48	19	0,01
neurosensory signs	26	50	0,02
palpitations	5	13	0,03
disorders Headache	6	8	NS
hemiparesis	2	0	0,02
lipothymia	2	4	0,06
asthenia	4	5	NS
Dyspnoea (stage II and III NYHA)	8	4	0,01
dizziness	1	1	NS

In the group of diabetic patients, the general average of arterial pressure (PA) 24 h, daytime and night-time, were higher than normal. Systolic loads were more important than diastolic loads. The average pulse pressure was 63.14 ± 16.5, average systolic and diastolic dipping physiological was $5.58\% \pm 6.86\%$ and $6.26\% \pm 8\%$, respectively.

Table III: Comparison of average clinical PA and daytime measurement MAPA

		diabetic patients	No diabetic patients	P
clinical measurement	PAS mmHg	158,6±24,7	147±25,3	0,01
	PAD mmHg	86±17	79,6±18,9	0,03
MAPA	PAS daytime mmHg	139,3±17,9	138,4±19,3	NS
	PAD daytime mmHg	76,88±9,4	81,1±14,6	0,02

PAS : systolic arterial pressure   PAD : diastolic arterial pressure

The concordance rate between the clinical measurement and MAPA in diabetics was 80% (Kappa coefficient = 0.77)
The concordance rate between clinical measurement and MAPA in non-diabetics was 72% (kappa = 0 , 69).

Table IV: the concordance of the clinical results and ABPM in patients with diabetes

|	HTA unbalanced by MAPA (n=66)	HTA balanced by MAPA (n=34)
HTA unbalanced by measuring Clinica (n=80)	64 (96,9%)	16 (47,1%)
HTA balanced by measuring Clinica (n=20)	2 (3,1%)	18 (52,9%)

Table V: the concordance of the clinical results and the MAPA in no diabetic patients

	HTA unbalanced by MAPA (n=72)	HTA balanced by MAPA (n=28)
HTA unbalanced by measuring Clinical (n=74)	58 (80,5%)	16 (57%)
HTA balanced by measuring Clinical (n=26)	14(19,5%)	12(43%)

15 % of diabetic patients were on diet and lifestyle measures alone, 16% on monotherapy, 59% in bitherapy with 77.9 % in fixed combination and 22.1 % in free association and 10 % in triple therapy

While 56% of non-diabetic patients were on diet and lifestyle measures alone, 22% in monotherapy and 22% in bitherapy with 36, 3% in fixed combination.

Figure 1: Diagram showing the therapeutic modes
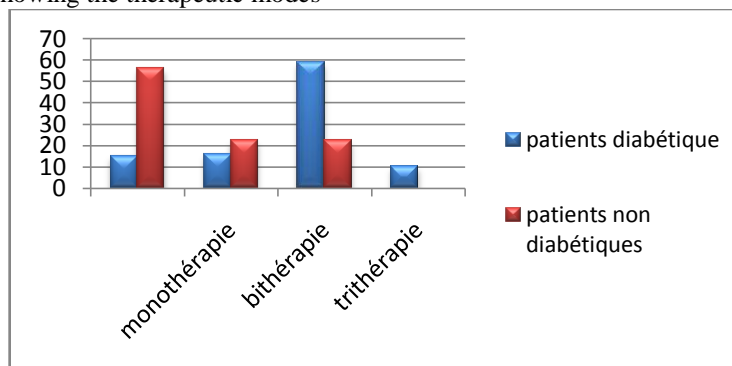
In diabetic patients, the converting enzyme inhibitor (IEC) was the most used in monotherapy. For non-diabetic patients, calcium inhibitor (IC) was the most used in monotherapy

The use of fixed combination was observed in 77.9 % of diabetic patients on biotherapy . The bitherapy was the most used mode of therapy in diabetic patients, 59% were on bitherapy.

The combination receptor antagonists angiotensin ii (ARA II) + diuretic (DU) was used in 69.6 %, compared with other fixed combinations. And the diuretic (DU) + converting enzyme inhibitor (IEC) association was used in 38.4% of free associations.

For non- diabetic patients, 56% were under only lifestyle modifications. The receptor antagonists angiotensin ii (ARA II) + the diuretic (DU) was the only association used in fixed bitherapy, and calcium inhibitor(IC) + and beta blocker (BB) was the most used in free association.

For other treatments , that is to say (statin and antiplatelet therapy) 55 % of diabetic patients were on statins or antiplatelet distributed as follows; 31% in antiplatelet distributed (AAP), 27% in statin   and 42% under antiplatelet + statin unlike the group of non- diabetic patients, no patient was under antiplatelet and statin.

Discussion

The diabetes alone is a true cardiovascular risk factor requiring global care including prevention, early detection and intensive treatment of risk factors. **[8]** Among these, hypertension has a predominant position due to its frequency because it significantly increases the risk and promotes vascular degenerative complications .Control of hypertension (HTA) reduces the number of complications, increase survival and reduce the cost of complications **[6]**. The proportion of deaths attributable to hypertension (HTA) is 23.6 % in diabetics against 14.6% in non-diabetic **[7]** .All these data justify the growing interest in hypertension (HTA) in diabetic patients [8]. In our study, the diabetic hypertensives were older than non-diabetic hypertensive patients. These results show that hypertension (HTA) in diabetic subjects increases with age **[9]**

The distribution of diabetes by sex showed a female predominance (55%) probably related to high durability in women **[10]**. This was also observed in two studies in Marrakech, with a 0.76 ratio sex and de1, 5 **[11]** unlike our study that objectified a slight male predominance whether in the group of diabetic and non diabetic patients. Dyslipidemia, smoking and obesity are frequent in diabetics, particularly hypertensive **[12]**. Our series has found the same finding. In our study, it was noted that all diabetic patients were type 2 Diabetics with unbalanced hypertension (HTA), have a greater length of diabetes, compared to diabetics with hypertension (HTA) is balanced, This shows the difficulty to balance hypertension (HTA) patients who have a longstanding diabetes

The UKPD study (United Kingdom Prospective Diabetes Study) demonstrated the benefit of glycemic control and blood pressure control, and that during the monitoring period, differences in blood pressure and HbA1c disappeared between Intervention and control groups in the space of one year. But the best benefit of early glycemic control on cardiovascular morbidity and mortality persisted throughout the follow up period, which was not the case for that of the decrease in blood pressure **[13]**. Which show the importance of a permanent control and the most optimal possible blood pressure.

In our study, 37 % of diabetic patients had imbalance glycemic control which 59.45 % had unbalanced hypertension (HTA) to MAPA .Hypertension (HTA) and diabetes contribute to a considerable morbidity and mortality.

In our study, degenerative complications of diabetes are found in 44 patients, dominated by nephropathy (37.9%) and retinopathy (25.8%) and neuropathy (8.7%).It was also noted that complications such as myocardial infarction (IDM) , stroke, Peripheral artery disease (PAD) ... are more frequent in diabetic hypertensive than non-diabetic hypertensive , myocardial infarction (IDM 4 % versus 1%), Peripheral artery disease (PAD 4 % versus 1%), Angina Stable (4% versus 0 %) , cerebrovascular accident (AVC 3 % versus 2%), renal failure, (IR 2 % versus 1%), transient ischemic attack (AIT 1 % versus 4%). Compared to the conventional arterial pressure (PA) measurement

The MAPA allows studying the levels of the arterial pressure (PA) of a subject in his daily living environment of day or night and therefore a better understanding of the physiology of the arterial pressure (PA).

It becomes a valuable tool to confirm a diagnosis particularly arterial hypertension (HTA) limit, identifying a white coat, confirmation of severe arterial hypertension (HTA), especially in elderly patients with high cardiovascular risk, .looking for paroxysmal arterial hypertension (HTA) and again highlighting of orthostatic hypotension access. It also assists in therapeutic decision and assesses the effectiveness of a treatment. It also has a prognostic interest shown by several studies... [14]. the prevalence of organ damage is significantly better correlated with information MAPA. Indeed, few studies have evaluated the contribution of MAPA in diabetics.   A prospective study conducted in France to objectify a discordance between clinical arterial pressure (PA) [15] and MAPA in 26.1 % of cases. Two other studies, conducted in Marrakech, [1] ,[19], respectively, have objectified a rate of concordance between clinical arterial pressure(PA) and MAPA , 62% (kappa = 0.62) and 75.34 % (kappa = 0.07) .In our study, MAPA has helped detect two cases (2% of the diabetic population) of imbalanced hypertension (HTA) while at the clinic extent they were balanced against 14 cases(14% of the non-diabetic population) , and 16 cases or 16% of diabetics who have been declared to the wrong balance clinical measure while they were well balanced at the MAPA (white coat) .Same number in no diabetic subjects with a concordance rate between clinical measurement and MAPA 80% (Kappa coefficient = 0.77) in diabetic hypertensive against 72% (Kappa coefficient = 0 , 69) in non-diabetic hypertensive patients. Thus, MAPA allows better understand the real level of arterial pressure (PA) in diabetics. It allows individualizing the population actually diabetic hypertensive and removal of individuals with a simple reaction alert. The perfusion pressure (PP) is a good preacher of cardiovascular events in the elderly, especially compared to the systolic arterial pressure (PAS). This value is considered suspicious if it exceeds 30 mm Hg and clearly pathological when it exceeds 50-55 mm Hg in hypertensive patients over 50 years [11].

In our study, the average pulse pressure in diabetic hypertensive patients was 63.14 mmHg ± 16.5 mmHg, whereas in non-diabetic hypertensive was 10.4 mmHg ± 56mmHg with a P = NS.

Conclusion

Hypertension (HTA) and diabetes constituently by their frequency and their complications present a real and major public health problem.

The measurement of the arterial pressure is a milestone in the treatment of hypertension (HTA). The MAPA, through the different measurements, can approach the pressure profiles of 24 hours which is well correlated to cardiovascular events.

The wide use of this exploration is an important aid to practitioners in the diagnostic phase, therapeutic and prognostic of the care of hypertension (HTA) in diabetic and non- diabetic patients.

If in our cardiology department at the Military Hospital Avicenne Marrakech, it is not to prescribe reticent MAPA in our patients, as the majority is mutual. The cost and availability problem in public hospitals remains the main limitations of this review which has become a major asset in the care of diabetic hypertensive or not

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