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The Contribution of the Ambulatory Blood Pressure Monitoring in the Assessment of Blood Pressure Control : A Cross Sectional Study at the Yaounde General Hospital

Contribution de la mesure ambulatoire de la pression artérielle dans l'évaluation du contrôle tensionnel à l'Hôpital Général de Yaoundé.

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ABSTRACT

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Mots clés : Contrôle tensionnel, Mesure ambulatoire de la pression artérielle, Yaoundé.

Key words: Blood pressure control ; Ambulatory blood pressure monitoring ; Yaounde.

Introduction. The evaluation of the efficacy of antihypertensive treatment in the past was essentially based on the traditional method of measurement in the consultation room. This occasional measurement does not allow for the appreciation of the nycthemeral variations of blood pressure (BP), and therefore do not give a correct estimate of BP. **Methods.** This was a cross-sectional study carried out over a period of five months (February to June 2016) in the cardiology outpatient unit of the Yaoundé General Hospital. The subjects recruited were hypertensive patients undergoing treatment. Blood pressure control was set as the average of values gotten from 3 previous consultations in addition to that of the day of recruitment. The variables evaluated were the epidemiological characteristics; para clinical variables and the BP. The target for the averages of BP obtained from patients in a 24 hour period using Ambulatory blood pressure monitoring (ABPM) was BP < 130/80 mmHg. **Results.** One hundred and seventeen hypertensive patients were recruited. The male to female sex ratio was 0.53. Average age of participants was 59.77±11.42 years with extremes at 32 and 78 years for men, 30 and 87 for women. Obesity was found in 47.5%, dyslipidemia in 21.4% and diabetes in 18.60% of cases as the cardiovascular risk factor. ABPM showed that blood pressure was well controlled in 64.50% of the patients and not controlled in 36.50%. The nocturnal drop in BP was observed in 49 patients (41.50%). The antihypertensive drug regimen used was monotherapy in 33 cases (28%), bithérapie in 47 cases (40%), trithérapie or more in 36 cases (32%). **Conclusion.** The blood pressure which is usually gotten in the consultation room and seems controlled is not always the true reflection of nycthemeral control. This shows the importance of the ABPM and its use as a tool for the evaluation of the optimal BP control.

RÉSUMÉ

Introduction. L'évaluation de l'efficacité du traitement antihypertenseur s'est basée, pendant plusieurs années, essentiellement sur la mesure traditionnelle au cabinet médical. Cette mesure occasionnelle ne permet pas d'évaluer les variations de la pression artérielle tout au long du nyctémère et donc ne peut pas refléter le niveau réel de la pression artérielle. **Méthodologie.** Il s'agissait d'une étude transversale sur une période de 5 mois (février à juin 2016) en consultation externe de cardiologie à l'hôpital général de Yaoundé. Les sujets inclus étaient des patients hypertendus sous traitement. Le contrôle de l'hypertension était défini par la moyenne des chiffres tensionnels pris sur au moins 3 consultations précédentes ajoutée à celle du jour de l'entrevue. Les données évaluées étaient les caractéristiques épidémiologiques; les données paracliniques et la mesure ambulatoire de la pression artérielle. Le seuil fixé sur les moyennes de 24H était une PA < 130/80 mm Hg pour les patients contrôlés à la MAPA. **Résultats.** Cent dix-huit sujets hypertendus ont été recrutés. Le sex ratio H/F était 0,53 avec une prédominance féminine. L'âge moyen des patients 59,77±11,42 ans avec des extrêmes allant de 32 à 78 ans pour les hommes et 30 à 87ans pour les femmes. Comme facteur de risque cardiovasculaire, l'obésité était retrouvée dans 47,5%, la dyslipidémie dans 21,4% et le diabète dans 18,60%. La MAPA a révélé que la pression artérielle était effectivement contrôlée chez 64,5% des patients et non contrôlée chez 36,5%. Le dip nocturne est retrouvé chez 49 patients (41,5%). Le protocole antihypertenseur utilisé était une monothérapie dans 33 cas (28%), une bithérapie dans 47 cas (40%), une trithérapie dans 27 cas (23%), une quadrithérapie et plus dans 11 cas (9%). **Conclusion.** Une pression artérielle qui apparaît contrôlée en cabinet n'est pas toujours le reflet d'un contrôle nycthémeral. Ceci souligne l'importance et l'intérêt de la MAPA comme outil d'évaluation du contrôle tensionnel optimal.

INTRODUCTION

Hypertension is a growing public health problem in the world and most especially in the developing countries [1]. In the year 2000, it was estimated that about 26.4% of the world's population were hypertensive, with as many men as women being affected (26 and 26.1% respectively), and this percentage could increase to 29.2% by 2025 implying about 1.56 billion individuals will be hypertensive. Among the 972 million hypertensive adults, 333 million (34.3%) came from developed countries meanwhile, 639 million (65.7%) came from developing countries [2]. In 2015, Kingue et al found a prevalence of 29.7% in Cameroon [3]. Antihypertensive therapy helps to reduce 35 to 40% of strokes, 20 to 25% of myocardial infarctions, and more than 50% of heart failures [4].

Blood pressure control plays an important role of the management of hypertension. Due to its ability to get many recordings during the day as well as night, the ABPM has contributed considerably in practice. Its superiority to the conventional method of measuring blood pressure in the evaluation of the antihypertensive treatment is not questionable, because not only does it eliminate the possibility white coat hypertension, but also gives a more precise evaluation of the response to antihypertensive therapy [5]. Also, it gives information about nocturnal blood pressure which has an important prognostic value. Finally, it is more correlated to the affection of target organs by hypertension and the occurrence of cardiovascular events with respect to the conventional method [5].

In Cameroon, few studies have been done on ABPM, and have been narrowed down to the diabetic or renal failure population [6,7]. This can be partly explained by the absence of this tool most health structures, but also the lack of knowledge of the importance of this method by doctors who manage hypertensive patients [8]. Due to the preponderance of its role in the blood pressure control in the management of hypertension; we decided to carry out a study whose goal was to precise the actual level of blood pressure control in patients, using ABPM in a specialized center in Yaoundé.

METHODS

We carried out a prospective descriptive cross-sectional study in the Yaoundé General Hospital from the 1st of February to the 3rd of June 2016 (that is 5 months). It included a consecutive series of 118 patients, who had benefited from ABPM for the evaluation of treatment for known and treated hypertensive patients with an optimal blood pressure control in the consultation room (<140/90) during 3 successive visits. The threshold for normality were set as: blood pressure (BP) <135/85 mm Hg for 24 hour means; BP<135/85 mm Hg for diurnal means; and <120/70 for the nocturnal means.

The value retained to confirm the diagnosis of hypertension was a mean diurnal BP of 135/85mmHg; hypertension was considered controlled with BP<130/80 mm Hg for all the means gotten in 24 hours. Non-dipper patients were defined as those in whom the

reduction in nocturnal blood pressure with respect to diurnal averages was less than 10%. The variables studied were essentially the age and the sex; blood pressure control; type of hypertension (24hour, diurnal, nocturnal); presence of a nocturnal dip; the antihypertensive drug regimen used, and the therapeutic classes used.

Data was treated and analyzed with Epi-info 3.5.1 and SPSS 11.1 software. Results obtained were presented in the form of proportions for qualitative variables, means \pm standard deviations for quantitative variables. Significant values were set at $p < 0.05$.

RESULTS

There were 41 men (35%) and 77 women (65%), with an average age of 59.77 ± 11.42 years (extremes: 30 and 87 years). Hypertension was controlled in 76 patients (64.40%) (**Figure 1**).

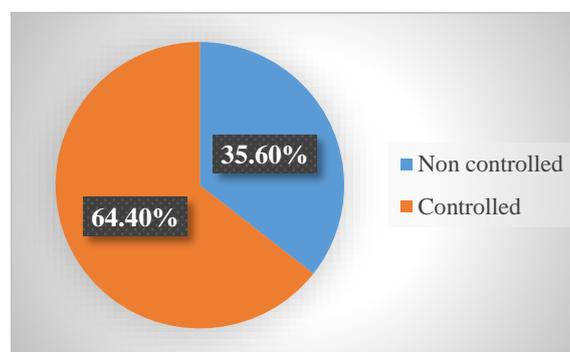


Figure 1. Evaluation of blood pressure control with ABPM
Non controlled : 24 hours average BP \geq 130/80 mmHg
Controlled : 24 hours average BP < 130/80 mmHg

In the non-controlled patients, 28 (67%) had diurnal and nocturnal hypertension (**Figure 2**).

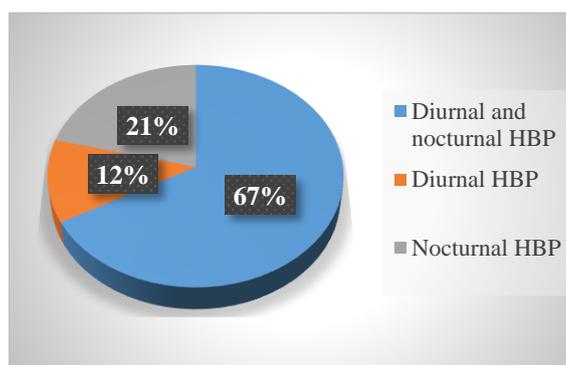


Figure 2. Description of the type of hypertension with respect to nyctemeral variation in non-controlled patients

Diurnal and nocturnal HBP : Percentage of patients presenting with both day and night hypertension

Diurnal HBP : Percentage of patients presenting with isolated daily hypertension

Nocturnal HBP : Percentage of patients presenting with isolated night hypertension

Among the 118 patients studied, 70 (58.50%) were identified as non-dippers (**Figure 3**).

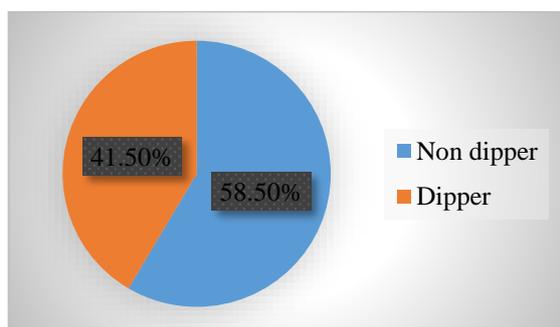


Figure 3. Interpretation of the nocturnal dip

Dipper : Percentage of patients with nocturnal blood pressure reduction between 10 and 15 %.

Non Dipper : Percentage of patients with nocturnal blood pressure reduction less than 10 %.

The antihypertensive regimen used was monotherapy in 33 cases (28%), bitherapy in 47 cases (40%), tritherapy in 27 cases (23%), and quadritherapy or more in 11 cases (9%). **Table 1** shows the factors associated with poor blood pressure control, and these are: age, male sex, smoking, obesity and menopause.

Table I: Factors of poor blood pressure control

Parameters	Group A (non-controlled), n=42	Group B (controlled), n= 76	P
Average Age	62 years	58 years	0,03
Male Sex	64,2%	18,42%	0,05
Diabetes	14%	21%	0,4
Smoking	7,4%	0%	0,7
Obesity	66%	36%	0,06
Menopause	57,14%	46,05%	0,4

DISCUSSION

The Ambulatory Blood Pressure Monitoring, a non-invasive technique, unlike conventional measuring methods is a blood pressure measuring method which establishes a good correlation between the level of blood pressure values and the affection of target organs, cardiovascular disease risk factors, and the long term prognosis of patients [9]. Also, it is recognized as the gold standard for the diagnosis of true hypertension [10]. It is a recommended tool for patients with a high cardiovascular disease risk, and those who need a nocturnal reduction in BP as in old and obese patients, those with secondary or resistant hypertension, diabetic patients, patients presenting with a metabolic syndrome or obstructive sleep apnea syndrome [9,10].

Current recommendations place a particular emphasis on the importance of measurement out of the consultation room, that is auto-measurement of blood pressure and ABPM in the management of hypertensive patients, with both therapeutic and diagnostic purposes [9,10]. Some of these studies have shown the superiority

and reliability of ABPM with respect to measurement in the consultation room on the notions of blood pressure control, masked hypertension and white coat hypertension. Among these studies, a more recent one [11] was particularly illustrative. In the latter, it was shown that treated and apparently treated hypertensive patients, according to measurements in the consultation room, 2/3 were finally proven not to be controlled after the use of ABPM. It was proven in our study that more than a third (35.4%) of patients apparently controlled in the clinic were not actually controlled after reevaluation with the ABPM. Our results are similar to those presented by El Ouila L, who noted a blood pressure control of 60% after ABPM [12].

Many studies have shown that the absence of a nocturnal decrease in blood pressure is associated with an increased risk of affection of target organs by hypertension, particularly microalbuminuria, left ventricular hypertrophy, renal failure and strokes (ischemic or hemorrhagic) [13,14]. It was equally noted that in diabetic patients, the absence of the nocturnal dip is associated more frequently with the development of a microalbuminuria [15]. Davidson et al recently published that the probability of doubling creatinine or aggravating kidney injury was more elevated in non-dippers than dippers [16].

Elsewhere, recent studies made evident that the conservation of this nocturnal dip is associated with an increase in survival especially in high risk groups (cardiovascular disease, chronic renal failure, diabetes) in whom the nocturnal blood pressure has to be a new therapeutic target [17,18].

Many theories have been postulated to explain the absence of the nocturnal dip and even the inversion of the nycthemeral cycle in certain subjects, namely: derangement of the autonomous nervous system, hormonal disturbances (menopause), old age, derangement of the baroreflex, obstructive sleep apnea, or an increased sensitivity to salt requiring a higher blood pressure at night to increase natriuresis [19,20]. Hypertension is one of the most important cardiovascular risk factors and at same time one of the most poorly controlled, particularly in patients having other cardiovascular diseases. Many studies have tried to determine the factors for poor control of hypertension. The prevalence of poor control increases with age, male sex, smoking, obesity and especially diabetes [21]. In our study, the factors for poorly controlled hypertension were: old age, male sex, smoking and obesity, and also menopause. This hypertension that is difficult to control can be explained by preponderant rigidity of arteries in old men and more so in smokers.

CONCLUSION

The ABPM indicated in the evaluation of antihypertensive therapy led us to the following conclusions: More than a third of patients appearing to be controlled in the clinic are not actually after doing an ABPM. This emphasizes on the importance of this tool as an instrument in the evaluation of the optimal blood pressure control in our environment.

The role of ABMP in evaluation of blood pressure control is worldwide known, but it was not till now demonstrated in our patients. This work confirm it and emphasizes the importance of this tool in our environment.

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