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A Study on Blood Pressure Control and Associated Factors Among Hypertensive Patients at Can Tho City Cardiovascular Hospital, 2023-2024

Nguyen Hoang Tuan Hung^{1,2}, Duong Hoang Thanh¹, Le Thanh Nhan¹, Nguyen Phuong Nam¹, Nguyen Thanh Quoc Dai¹, Tran Thanh Nghiem¹, Nguyen Nhat Hao³

¹The Faculty of Medicine of Can Tho University of Medicine and Pharmacy

²The International Faculty of Medicine of Nam Can Tho University

³The Faculty of Medicine of Nam Can Tho University

Abstract

Objectives: Hypertension is a chronic cardiovascular condition that greatly affects public health. It is associated with factors such as age, gender, lifestyle, overweight/ obesity and socio-economic status. Controlling blood pressure to the target level is an important goal of treatment, aimed at reducing complications in target organs. The study was conducted with the objectives: (1) to determine the percentage of patients achieving the blood pressure control target; (2) to evaluate some related factors on achieving of blood pressure control target in the study group.

Methods: Cross-sectional study on 120 outpatients with hypertension disease at Can Tho Cardiovascular Hospital from March 2023 to March 2024.

Results: The majority of patients were female (70.8%); overweight/obesity was the most common characteristic (53.3%), next came from alcohol consumption; (33.3%), diabetes (30.0%), high salt intake (27.5%), and smoking (19.2%). Most of patients achieved blood pressure target (86.7%). Patients who did not reach BP target had a higher rate of using antihypertensive drugs than patients who reached the BP target ($p=0.035$).

Conclusions: Hypertensive patients treated as outpatients were mostly female. A high proportion of hypertensive patients achieved the control target. These patients were mostly male, age <70, with less risk factors exposed. Compared with others, patients who did not achieve BP target used more antihypertensive drugs.

Keywords: Hypertension, blood pressure control, risk factors

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Author contact:

Nguyen Hoang Tuan Hung

Email: tuanhung290200

@gmail.com

Phone: +84343940321

1. INTRODUCTION

Hypertension has shown an increasing prevalence and has become a significant public health concern. In addition, the rapid rise in average life expectancy has led to a growing elderly population, which in turn contributes to the increasing

number of individuals affected by hypertension. A nationwide survey conducted as part of the May Measure Month campaign in 2019 reported a hypertension prevalence of 33.8% [1]. If left untreated or poorly controlled, hypertension can lead to complications in

target organs such as the brain, heart, kidneys, eyes, and blood vessels, adversely affecting quality of life and potentially resulting in death. Hypertension was associated with age, sex, dietary habits, obesity, comorbidities, and lifestyle behaviors [2]. Hypertensive patients can prevent disease-related complications by effectively managing risk factors and achieving target blood pressure control.

Identifying factors associated with hypertension and implementing appropriate control measures may help reduce the burden of hypertension in the community and improve treatment quality. In Vietnam, the rate of blood pressure control has been investigated in various regions; however, there remains a lack of consensus regarding the criteria for defining blood pressure control. The studies by Nguyen Thi Ngoc Van (2022) in Can Tho and Duong Ngoc Dinh (2022) in Kien Giang applied the blood pressure control criterion of $\leq 140/90$ mmHg [3] [4]. The study by Dong Thi Ngoc Lam (2021) in Bac Giang applied the blood pressure control criteria issued by the Vietnam National Heart Association in 2018 [5]. In 2022, the Vietnam National Heart Association issued the latest guidelines on the diagnosis and management of hypertension [6]. According to these guidelines, the assessment of blood pressure control should not rely solely on measured blood pressure values, but also take into account the patient's age and comorbid conditions, enabling a more accurate and comprehensive evaluation. In the Mekong Delta region, a study by Tran Kim Son and colleagues reported that 27.7% of adults in Can Tho were diagnosed with

hypertension in 2022 [2]. Therefore, we conducted this study with the following objectives:

- + To determine the proportion of hypertensive outpatients achieving target blood pressure control, based on the 2022 guidelines of the Vietnam National Heart Association, at Can Tho City Cardiovascular Hospital during the period 2023–2024.

- + To evaluate the influence of selected risk factors on achieving target blood pressure control among hypertensive outpatients at Can Tho Cardiovascular Hospital during the period 2023–2024.

2. MATERIALS AND METHODS

2.1. Study population

- **Study population:** hypertensive outpatients treated at Can Tho City Cardiovascular Hospital from March 2023 to March 2024.

- **Inclusion criteria:**

- + Patients aged 18 years or older who were diagnosed with hypertension

- + Receiving outpatient treatment and being followed for a duration of at least three months

- + Patients who provided informed consent to participate in the study

- **Exclusion criteria:**

- + Patients who were experiencing severe internal medical conditions, including shock, respiratory failure, severe infections, end-stage cancer, chronic kidney disease requiring hemodialysis, acute myocardial infarction, acute stroke, or severe diabetes mellitus with complications such as hyperosmolar state, acidosis, or infections, were excluded.

- + Patients who were experiencing hypotension (blood pressure $< 90/60$ mmHg)

+ Patients who were experiencing visual or hearing impairments, psychiatric disorders, or intellectual disabilities.

2.2. Methods

- **Study design:** descriptive cross sectional study.

- **Sample size:** was calculated using Cochran's formula

$$n = \frac{Z^2 \cdot \frac{\alpha}{2} \cdot p(1-p)}{e^2} \approx 89.2 \Rightarrow n = 90$$

With $\alpha=0.05$, $Z=1.96$, e is the margin of error ($e=0.07$); $p = 0.869$ was the estimated proportion of patients achieving blood pressure control, based on the study by Nguyen Thi Ngoc Van et al. (2022) conducted at Can Tho General Hospital [4].

In total, data were collected from 120 patients.

- **Sampling method:** convenience sampling method. Patients who visited the outpatient clinic of Can Tho Cardiovascular Hospital and met the inclusion criteria were invited to participate in the study. Each patient underwent blood pressure measurement and was interviewed to collect data relevant to the two study objectives.

- **Study content:**

+ Participant characteristics included age, sex, overweight/obesity (defined as $BMI \geq 23 \text{ kg/m}^2$), smoking status, diabetes mellitus, alcohol consumption, and high-salt dietary habits;

+ The proportion of hypertensive patients who achieved target blood pressure levels, as defined by the 2022 guidelines of the Vietnam National Heart Association[6];

+ The influence of factors such as age, sex, overweight/obesity, diabetes mellitus,

smoking, alcohol consumption, high-salt diet, and the number of antihypertensive medications being used on blood pressure control status.

Target blood pressure: was categorized into two groups: achieving target blood pressure and not achieving target blood pressure. Classification was based on supine blood pressure measurements, in accordance with the criteria defined by the 2022 guidelines of the Vietnam National Heart Association[6]:

+ For individuals aged 18 to 69 years with one or more comorbid conditions (coronary artery disease, diabetes mellitus, heart failure, chronic kidney disease, or stroke), the target blood pressure was defined as $<130/80 \text{ mmHg}$.

+ For individuals aged 18 to 69 years without the aforementioned comorbid conditions, the target blood pressure was defined as $<140/80 \text{ mmHg}$.

+ For individuals aged 70 years and older, the target blood pressure was defined as $<140/80 \text{ mmHg}$.

2.3. Statistical analysis: Data were collected and entered using Excel 2019, and statistical analysis was performed using SPSS version 20.0. Descriptive statistics were used to present qualitative variables as percentages. Analytical statistics included the chi-square test (χ^2) or Fisher's exact test, as appropriate. A p-value of less than 0.05 was considered statistically significant.

2.4. Ethical considerations: This study received ethical approval from the Ethics Committee in Biomedical Research of Can Tho University of Medicine and Pharmacy under reference number 23.040.SV/PCT-HDĐĐ.

3. RESULTS

3.1. Characteristics of the Study Population

Over the course of the study, we enrolled 120 patients with hypertension. Selected baseline characteristics of the study population are presented in Table 1.

Table 1. Characteristics of the Study Population (n=120)

Characteristics	Frequency (n=120)	Ratio (%)
Male	35	29.2
Female	85	70.8
Aged 18-69	85	70.8
Age ≥ 70	35	29.2
Overweight/obesity	64	53.3
Former smoker	23	19.2
Diabetes	36	30.0
Alcohol consumption	40	33.3
High salt intake	33	27.5

The rate of male was lower than that of females (29.2% < 70.8%). Participants aged 70 years or older accounted for 29.2%. Overweight/obesity was the most common characteristic (53.3%), followed by alcohol consumption (33.3%), diabetes

3.3. Influence of selected risk factors on achieving target blood pressure control in the hypertensive patients

Table 2. Impact of Selected Risk Factors on Target Blood Pressure Control

Characteristics	Achieving target blood pressure (n=104) n(%)	Not achieving target blood pressure (n=16) n(%)	χ ² / Fisher's, p
Male	27 (26.0)	8 (50.0)	0.074
Aged ≥ 70	30 (28.8)	5 (31.2)	1.000
Overweight/obesity	53 (51.0)	11 (68.8)	0.184
Diabetes	30 (28.8)	6 (37.5)	0.482
Alcohol consumption	34 (33.0)	6 (37.5)	0.724
Former smoker	18 (17.3)	5 (31.2)	0.188
High salt intake	29 (27.9)	4 (25.0)	1.000
Using ≥3 antihypertensive drugs	44 (65.7) (n=67)	9 (100.0) (n=9)	0.035

mellitus (30.0%), and high salt intake (27.5%). Former smoking was less common (19.2%).

3.2. Proportion of hypertensive patients achieving target blood pressure control according to the 2022 Guidelines of the Vietnam National Heart Association

Among the 120 hypertensive patients, 104 achieved the target blood pressure control, while 16 did not (Figure 1).

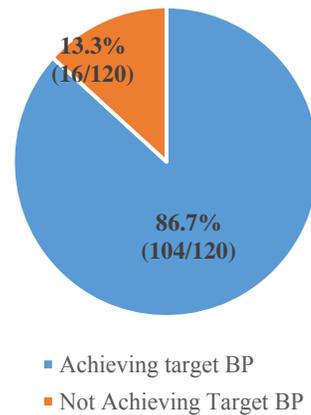


Figure 1. Target blood pressure control in hypertensive patients

The majority of patients (86.7%) achieved target blood pressure control, while a smaller proportion (13.3%) did not.

Most patients who achieved target blood pressure were male (92.1%), with a lower proportion aged ≥ 70 years (28.8%). The most frequent characteristic was using ≥ 3 antihypertensive drugs. Rates of obesity, diabetes, alcohol use, and high salt intake were low. Patients without target BP control had a higher rate of using ≥ 3 drugs than those with control ($p = 0.035$).

4. DISCUSSION

4.1. Characteristics of the Study

Population

The proportion of male participants was low (29.2%), which was consistent with the findings of Tran Song Hau et al. (2022) in Can Tho [7]. However, the proportion of male participants was lower than that of females, which differed from previous studies conducted in Vietnam [5] [8]. The proportion of patients aged ≥ 70 years (29.2%) was higher than that reported by Tran Song Hau (2022) in Can Tho, which was 20.4% [7]. This difference may have resulted from variations in the study populations. Regarding hypertension-related risk factors, the study recorded a prevalence of overweight/obesity in 53.3% of patients. This rate was consistent with findings from domestic studies on hypertensive patients, including Nguyen Thi Huyen at Hai Duong General Hospital (53.1%) and Dong Thi Ngoc Lam in Bac Giang (54%) [5] [8]. However, the prevalence of alcohol consumption in the study by Nguyen Thi Huyen was higher (46.8%) compared to our findings (33.3%). This difference may be explained by the lower proportion of male participants in our study, as alcohol consumption is more common among men than women. Diabetes mellitus was observed in 30% of patients, which was comparable to the findings of Doan Phuoc Thuoc in Hue (26.1%) [9]. This rate was lower than that

reported by Nguyen Thi Huyen (2023), which was 51.6% [8]. Diabetes was a common comorbidity of hypertension, with an estimated prevalence ranging from 30% to 80%. A total of 27.5% of hypertensive patients in our study reported a high salt intake, which was lower than the 53.1% reported in the study by Nguyen Thi Huyen. Smoking was less common among hypertensive patients in our study (19.2%), whereas Nguyen Thi Huyen reported a considerably higher rate of 65.6% [7]. Previous studies have shown that smoking is less common among women than men, which was consistent with the male-to-female ratio observed in our study.

4.2. Proportion of hypertensive patients achieving target blood pressure control according to the 2022 Guidelines of the Vietnam National Heart Association

The study recorded a high proportion of patients achieving target blood pressure control (86.7%). This finding was consistent with that of Nguyen Thi Ngoc Van et al., who reported a similar rate of 86.9% in their 2022 study at Can Tho General Hospital [4]. However, some studies reported lower rates of blood pressure control. For example, Dong Thi Ngoc Lam et al. (2021) found that only 25.6% of hypertensive outpatients in Bac Giang achieved target blood pressure control [5]. However, at that time, the 2022 Guidelines of the Vietnam National Heart Association had not yet been issued. Therefore, these studies used a threshold of 140/90 mmHg to assess blood pressure control and did not account for age or comorbid conditions as applied in our study. International studies have also reported lower rates of blood pressure control. This difference may be attributed to the fact that patients in our study had a known history of hypertension and were already receiving treatment, which may

have contributed to better adherence. In a 2023 study conducted in Hue, Doan Phuoc Thuoc applied the 2022 guidelines of the Vietnam National Heart Association and reported that 53.6% of hypertensive patients achieved target blood pressure control, a lower rate than that observed in our study [9]. The study did not assess cases in which the average blood pressure was excessively low relative to the treatment target, nor did it evaluate patients' tolerance to low blood pressure. As a result, the proportion of patients achieving target blood pressure may have been overestimated; however, we believe that the potential difference was not clinically significant.

4.3. Influence of selected risk factors on achieving target blood pressure control in the hypertensive patients

Most patients who achieved target blood pressure were male (92.1%), consistent with the findings of Doan Phuoc Thuoc (2023), who reported better blood pressure control among male patients compared to females [9]. The proportion of patients aged ≥ 70 years was relatively low (28.8%), possibly because this group had more comorbidities and a longer duration of illness, which may have affected treatment effectiveness. The most common characteristic among these patients was the use of three or more antihypertensive medications, which was consistent with the findings of Dong Thi Ngoc Lam et al. [5]. In addition, the rates of overweight/obesity, diabetes mellitus, alcohol consumption, and high-salt diet were not high among patients who achieved target blood pressure. Previous studies have shown that these risk factors are associated with hypertension control [2] [7]. There were no significant differences in sex, age, overweight/obesity, diabetes mellitus, alcohol consumption, or high salt intake

between patients who achieved target blood pressure control and those who did not. However, the study by Doan Phuoc Thuoc et al. at Hue reported that sex and high-salt dietary habits were statistically associated with hypertension control ($p = 0.022$) [9]. When comparing patients who achieved target blood pressure control and those who did not, we found that the group without control had a higher proportion of patients using three or more antihypertensive medications ($p = 0.035$). However, the sample size was smaller than initially calculated, and the combination of different antihypertensive agents and their dosages may have influenced treatment outcomes.

This study was among the first in the Mekong Delta region to apply the latest 2022 blood pressure control guidelines issued by the Vietnam National Heart Association. However, treatment targets for hypertension have recently evolved, as reflected in the updated 2024 guidelines from the European Society of Cardiology (ESC). This study is intended for reference purposes and reflects the local clinical reality during the study period. Further research with larger sample sizes and appropriate study designs is needed to monitor treatment outcomes and apply updated guidelines for a more comprehensive evaluation of blood pressure control in hypertensive patients.

5. CONCLUSION

Among hypertensive outpatients, female patients were more commonly observed. Overweight/obesity, alcohol consumption, and diabetes mellitus emerged as the most common comorbid conditions. A high proportion of patients (86.7%) achieved target blood pressure control. Factors such as age, sex, overweight/obesity, diabetes, alcohol use, smoking, and high-salt diet were not

associated with blood pressure control status. However, patients who did not achieve target blood pressure were more likely to be on polypharmacy (≥ 3 antihypertensive medications) compared to those who achieved control.

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