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**Submission date:** 23-Apr-2021 07:21AM (UTC+0700)

**Submission ID:** 1567112024

**File name:** 4-Hypertension\_and\_antihypertensive.pdf (707.55K)

**Word count:** 3125

**Character count:** 17589

# Hypertension and Antihypertensive Drugs Toward Erectile Dysfunction

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## Abstract

Antihypertensive drugs involved in many sexual problems, particularly erectile dysfunction, and being the main cause of non compliance toward antihypertensive medication. Patient who has hypertension, even the disease progression and medication maybe have some detrimental effects to the sexual function. The aim of this study is identify the effect of hypertension and antihypertensive drugs to the erectile function. A cross-sectional and analytic observational study was conducted in adult community at Redemptor Mundi church, Surabaya, East Java, obtained 30 samples of men aged  $\geq 45$  years. Research data Included are measuring result of blood pressure, the medication history of antihypertensive and erectile function measured by *International Index of Erectile Function* (IIEF) questionnaire recorded. Outcome of the study show significant correlation between hypertensive condition and IIEF questionnaire result ( $p = 0.010$ ) with negative and moderate strength correlation ( $r = - 0.466$ ). While antihypertensive medication history not showing the difference of questionnaire result between two groups ( $p = 0.273$ ). The conclusion that hypertensive condition have effect toward erectile function, while antihypertensive medication history did not have effect to the erectile function.

**Keywords :** Hypertension, antihypertensive drugs, erectile disfunction, blood pressure, side effects

## Introduction

Hypertension is one of the biggest health problem, nationally and internationally. Based on the results of Basic Health Research (Riskesdas) in 2013, the prevalence of hypertension in Indonesia measured at age  $\geq 18$  years is 25.8%. Respondents who had normal blood pressure but were taking hypertension drugs were 0.7%. So the prevalence of hypertension in Indonesia is 26.5% (25.8% + 0.7%). Most cases of hypertension in the society are undiagnosed (63.2%).<sup>1</sup> The big prevalence of hypertension became a major concern of the government, especially related to medications and complications.

Antihypertensive therapy is generally involved in many sexual problems, particularly erectile dysfunction, and then considered to be a major cause of non-adherence to anti-hypertensive medications in patients with erectile dysfunction side effects. However data on the causal relationship and its effect are conflicting. In a study on men, beta-blockers and diuretics were associated with

erectile dysfunction, although other studies opposed this finding. In hypertensive case, both disease progression and medication may have adverse effects on sexual function.<sup>2,3</sup>

Erectile Dysfunction (ED) a sexual dysfunction on males is the inability to achieve or maintain an erection at the time of penetration.<sup>4</sup> The data shows that vascular problems had been found in most affected individuals. Hypertension is associated with structural and functional abnormalities of blood vessels throughout the body, not excluding blood vessels in the genitals.<sup>5</sup>

Lack of data on sexual health and its correlation to hypertension and its therapy reduces the ability of clinicians to provide counseling to patients about the side effects of treatment and the possibility of sexual problems.<sup>2</sup> This study observes the effect of hypertension conditions and the use of antihypertensive medication on the sexual function of male subjects, particularly related to erectile dysfunction.

## Method

This study is a quantitative research with cross-sectional design and analytic observational method. This step aims to analyze the relationship between the hypertension condition and the use of antihypertensive drugs with erectile dysfunction conditions of the subjects.

The population is the adult community of Redemptor Mundi Catholic Church in Surabaya, East Java which fulfills the research criteria. The inclusion criteria are male, age  $\geq 45$  years old in February 2018 (at the time of the study), members of the community in Redemptor Mundi Catholic Church Surabaya, a married man with living spouse, has the ability to read, write and speak Indonesian well, willing to follow the study and signed the informed consent. While exclusion criteria are subjects with a history of an infertile disease, penile tissue disorders, acute testicular trauma and undescended testis.

The number of samples selected were 30 samples. The sampling technique is total sampling until the number of samples is fulfilled with the minimum amount to be analyzed using IBM SPSS program.

The data of past medical history of hypertension and hypertensive drug use were obtained through interviews, blood pressure data obtained from measurements and all of them were recorded in Data Logger Sheet (DLS). Blood pressure measurement was done two times with at least 5 minutes rest, the measuring instrument used was the standard mercury sphygmomanometer and stethoscope. The method of measuring blood pressure refers to the guidelines set by JNC VII. While the erectile dysfunction data was obtained through the International Index of Erectile Function (IIEF) questionnaire filled by the subject who were willing to be involved to take data on one chance. The questionnaire was translated into Indonesian language and has been validated. Six questions describing erectile function (question number 1, 2, 3, 4, 5 and 15) were assessed based on the answers given by the subjects (grades 0-5) and the value of each question was summed and classified into several categories: severe dysfunction (1-10), moderate dysfunction (11-16), mild to moderate dysfunction (17-21), mild dysfunction (22-25) and no dysfunction (26-30).<sup>6</sup>

Statistical analysis used were descriptive statistical analysis which was used for the initial characteristics of the study sample, whereas the correlation of hypertension conditions and history of antihypertensive drug use with erectile dysfunction condition analyze using inferential analysis were Spearman correlation test and Contingency Coefficient Test. Data processing through several steps of editing, coding and grouping in tables using IBM SPSS program 17 edition.

Prior to the data retrieval process, samples will get an explanation of the objectives, procedures, benefits, risks of the study and the security of identity confidentiality. As a proof of willingness to participate in this study, patients are required to sign an informed consent. This research upholds the ethical principles of beneficence, the right to self-determination, the right to full disclosure, the right to privacy and the right to fair treatment.

## Result

The profile of the research sample involved in this study described in Table 1.

**Table 1. Characteristics of Research Sample**

Characteristics of Research Sample	Frequency (n)	Percentage (%)
Age group in years		
45-55	8	26.7
56-65	15	50.0
66-75	6	20.0
76-85	1	3.3
Level of Education		
Senior High School graduates/equivalent	17	56.7
Bachelor degree	11	36.7
Master/ Profession	2	6.7
Workload		
Jobless	7	23.3
Working	23	76.7

Source : Primary Data

Table 1 shows that the age group of 56-65 years with 15 samples (50.0%) was the largest. The largest education level group is the senior high school graduates/ equivalent with 17 samples (56.7%), while for working status, most of the sample were working with 23 samples (76.7%).

**Table 2 Characteristics of Research Sample Related to Variables**

Characteristics of Research Sample	Frequency (n)	Percentage (%)
The history of hypertension		
Ever Suffered	16	53.3
Never	14	46.7
Blood Pressure		
Normal	6	20.0
HT hypertension (SBP 120-139, DBP 80-89)	14	46.7
HT stage 1 (SBP 140-159, DBP 90-99)	9	30.0
HT stage 2 (SBP >=160, DBP >=100)	1	3.3
Antihypertensive medication		
Yes	13	43.3
No	17	56.7
Result from IIEF Questionnaire (Erectile Dysfunction)		
Severe dysfunction (1-10)	4	13.3
Moderate dysfunction (11-16)	3	10.0
Mild to moderate dysfunction (17-21)	4	13.3
Mild dysfunction (22-25)	7	23.3
No dysfunction (26-30)	12	40.0

Source : Primary Data

Table 2 shows the characteristics of the research samples related to the variables in the study, ie the history of hypertensive diseases based on the interviews result, there were 16 samples (53.3%) who answered had suffered from hypertension, most of the sample's blood pressure levels belong to prehypertension category according to JNC VII as 14 samples (46.7%). The history of antihypertensive drugs used showed that as many as 17 samples (56.7%) answered had never used antihypertensive drugs. While the results of the IIEF questionnaire shows that the level of erectile dysfunction disorder mostly belongs to the normal category as 12 samples (40.0%).

**Table 3 Types of Antihypertensive Drugs Used**

Types of Antihypertensive Drugs	Frequency (n)
Diuretics	0
ACE Inhibitor	2
ARB	0
Beta Blockers	0
CCB	10
Vasodilator	0
Centrally Acting Drugs	0
Combination (Beta Blockers and CCB)	1

Table 3 shows the type of antihypertensive drugs used by sample, where the most used drug category is CCB group (10 samples) and also found a sample using a combination of two kinds of drugs that are CCB group with beta blockers.

The correlation analysis between blood pressure and the results of IIEF questionnaire using Spearman test showed a significant correlation between hypertension condition (described with blood pressure) and the results of the questionnaire of erectile function IIEF ( $p = 0.010$ ) with a negative value and moderate strength ( $r = -0.466$ ). While the history of antihypertensive drugs used did not show any differences in the questionnaire results of erection function in both groups ( $p = 0.273$ ).

## Discussion

A man's sexual response reflects a dynamic balance between the forces of stimulation and detention. Any physiological or organic disorder in the central and peripheral mechanisms that regulate erection and detumescence have a clear impact on sexual function. Both high blood pressure and antihypertensive treatment are some of the disorders associated with sexual dysfunction.<sup>7</sup>

### *Hypertension and Erectile Dysfunction*

In this study, ten of 30 subjects (33.3%) had hypertension. Eighteen of 30 samples had erectile dysfunction based on IIEF questionnaires. The result of Spearman's correlation test showed that there was a significant correlation between hypertension and erectile dysfunction ( $p = 0.010$ ). Meanwhile the correlation coefficient showed a negative value ( $r = -0.466$ , which is a moderate strength of correlation). This means that when the blood pressure is higher, the IIEF questionnaire score will decrease (erectile dysfunction is more severe).

The results of this study are consistent with most studies that accurately emphasize the high prevalence of erectile dysfunction in hypertensive patients compared with normotensives subjects. It has been estimated that people with hypertension have a relative risk of 1.3-6.9 to developed erectile dysfunction. As an example, two studies from Southern Europe reported that there were higher prevalences of erectile dysfunction in hypertensive patients (45.8% and 35.2% in Spain and Greece respectively), compared to the general populations with normal blood pressure in Spain (18.9%) and in Greece (14.1%).<sup>5</sup>

A study in the southwest of Nigeria also showed information that the higher prevalence of erectile dysfunction was seen in subjects with hypertension, compared to samples with normal blood pressure (75% vs. 56.9% respectively and  $p = 0.007$ ).<sup>8</sup>

Some authors have reported significant associations between hypertension and erectile dysfunction although the mechanism how hypertension can cause erectile dysfunction remains unclear. A theory says the low production of arterial nitric oxide (including penile arteries) in hypertensive patients is the culprit. Nitric oxide is important for the increased production of cyclic

guanosine monophosphate in the penis which causes corpora cavernosa to relax and trigger an erection. Another study author argues that the progression of atherosclerosis in hypertensive patients can contribute to erectile dysfunction.<sup>8</sup>

Penile erection occurs from increased blood flow to the corpora cavernosa and its depends on perfusion pressure, blood vessel dilatation, and cavernosal smooth muscle relaxation. Erectile dysfunction in hypertension probably represents a disorders in some of these factors needed in normal sexual function. Atherosclerotic stenosis or the lowering blood vessel wall-to-lumen-ratio is attributed to decrease blood flow, which impairs the process of penile dilatation.<sup>9</sup>

The correlation between hypertension and sexual dysfunction in men is actually complex, as a reduced sexual function is a natural part of the aging process and the incidence of hypertension increases with age.<sup>10</sup> A study by Akinbode shows that age is the only important predictor factor of the erectile dysfunction occurrence. Subjects with age  $\geq 65$  years and 46-64 years of age, were three times more likely to suffer from erectile dysfunction than subjects with age  $\leq 45$  years. Several studies have also reported a strong association between erectile dysfunction and age.<sup>9</sup>

In MMAS (Massachusetts Male Aging Study), after adjustment of the age factor, the higher probability of impotence is directly related to heart disease, diabetes mellitus, anger and depression index, and hypertension.<sup>11</sup> This gives a suggestion that the modification of the ages of subjects included in the future study is needed.<sup>11</sup>

### *Antihypertensive Medication and Erectile Dysfunction*

In this study, when antihypertensive medication as variable correlated with erectile dysfunction disorder experienced by the subjects using the Contingency Coefficient test yielded  $p$ -value = 0.273. This result means that antihypertensive medication did not show the different results of erection function questionnaires in each group (taking medication or not).

The results of this analysis differ from some studies that have been mentioned before that the data from three

decades indicate that 2.4% -5.8% of male patients with hypertension have one or more symptoms of sexual dysfunction at various levels of severity during the use of antihypertensive drug therapy.<sup>12</sup>

<sup>1</sup> The prevalence of erectile dysfunction has been found to be higher in patients with treated hypertension than untreated patients and normotensives subjects. In the original MMAS study, a significant correlation between antihypertensive drugs and erectile dysfunction has been observed, however further analysis after some adjustments, reveals that only non-thiazide diuretics are associated with erectile dysfunction events.<sup>9</sup>

<sup>6</sup> There is also a study that says in addition to the hypertensive condition, sexual dysfunction in male hypertensive patients may also be caused by antihypertensive treatment. The available evidence suggests that central sympatholytic agents,  $\beta$ -adrenoreceptor antagonists ( $\beta$ -blockers) and diuretics may be the potential drug for further disruption of sexual function. Calcium channel antagonists and ACE inhibitors <sup>8</sup> may have a neutral effect on the outcome. Previous data from several random and open studies suggest that the angiotensin II (AT) I receptor antagonist may also be associated with improved sexual function.<sup>10</sup>

Based on the statement from that study, it can be explained the estimates cause of the results in this <sup>8</sup> study is different from some studies on the effects of the use of antihypertensive drugs on erectile dysfunction. The sample in this study which used antihypertensive drugs was small (13 samples) to show the effect of erectile dysfunction. Furthermore, if observed, antihypertensive drugs taken by the sample, not the class of antihypertensive drugs presumed to have a high probability of causing erectile dysfunction ( $\beta$ -blockers and diuretics) but calcium channel blockers and ACE inhibitors are the drugs that give neutral effects.

Some of drug types that can cause erectile dysfunction, such as angiotensin II (Ang II) may modulate erectile activity, it seems like regulate penile arteries blood pressure or modulate neuron signal induction from the sacral spine or brain.<sup>7</sup> Other mechanism explains that  $\beta$ -blocker and diuretics reduce and maintain blood pressure still lower when blood flows into the penis. This ultimately will inhibit blood flow to the penis, and consequently, hypertensive patients often

have difficulty to get and maintain an erection, resulting in erectile dysfunction.<sup>4</sup>

<sup>3</sup> The wide variations in the prevalence rates of sexual problems written in the literature most likely indicate the differences in research methodology (lack of subject control), type of antihypertensive treatment used, the presence of other disruptive medications, age differences in the study population, and the cultural, social and economic factors.<sup>7</sup>

In clinical practice settings, the prevalence of sexual dysfunction is likely to be higher than reported in clinical studies because the personal nature to this problem often make patients and/or doctors unwilling to discuss the issues openly.<sup>7</sup>

## Conclusion

This study concludes that hypertension has an effect on erectile function, while the history of antihypertensive treatment has no effect on erectile function obtained through the IIEF questionnaire.

In general, the results of this study require larger populations and more samples to be able to describe the effect of using antihypertensives from different drug classes. In addition, there is also the need of exclusion criteria for the use of other drugs that can cause side effects of erectile dysfunction.

**Ethical Clearance:** The ethical clearance of the research issued by Ethical Board of Medicine Faculty Widya Mandala Catholic University Surabaya.

**Source of Funding:** The source for funding this research are taken from the annual grant of Institute for Research and Community Service (LPPM) in Widya Mandala Catholic University Surabaya

<sup>9</sup> **Conflict of Interest:** There is no conflict of interest in this research as well as the funding.

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