

Stress associated with hypertension in middle-age and elderly in Binong, Tangerang



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ABSTRACT

Introduction: It is widely recognized that stress cannot be eliminated from one's life and that stress may be associated with the prevalence of hypertension, for which the role of stress as a risk factor is being debated in terms of its correlation with hypertension incidence. This study examined the correlation between the stress of the middle-aged and elderly with hypertension.

Methods: This study applied a cross-sectional study using purposive sampling to recruit the respondents in Binong Tangerang, Indonesia. A modified questionnaire was used to collect the demographic data, stress, and smoking behavior. Blood pressure examinations were also conducted to identify the level of hypertension.

Results: A total of 145 respondents consisted of 79 (54.5%) middle age and 66 (45.5%) elderly were examined. Most of the respondents (82.8%) were female, and half of them were Sundanese (50.3%). Half of the respondents were categorized as pre-hypertension (42.8- 53.1%), where most of the respondents had non-smoking behavior (82%), and half of them were at the level of severe stress (57.2%). There was a significant correlation between respondents' stress levels and hypertension (p-value < 0.05).

Conclusion: Stress is related to hypertension in middle age and elderly in the Binong community. Therefore, stress management training is needed to promote the quality of life for middle age and elderly with hypertension at Posbindu in the Binong community.

Keywords: elderly, hypertension, middle-aged, smoking, stress.

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INTRODUCTION

Hypertension is one of the leading causes of premature death worldwide. WHO (World Health Organization) reported that about 1.13 million people worldwide suffered from hypertension, and two-thirds of them were from low-middle income countries.¹ Hypertension is also known as a non-communicable disease that is contributing to the mortality rate worldwide. Thus, it is crucial to detect the risk factors of hypertension, especially in community settings, to promote the quality of life of clients with hypertension. Risk factors of hypertension are divided into modifiable and nonmodifiable factors.² The nonmodifiable factors include age, gender, and genetic factors.^{2,3,4,5} The modifiable factors include smoking behavior, stress, obesity, alcohol consumption, coffee, salt, and exercise habits.^{2,3,4,5}

In a previous national population-based survey on hypertension in Indonesia, the age-adjusted prevalence for

adults (≥ 18 years old) was 33.4%, and for ≥ 40 years old was 48.6% in 2014-2015.⁶ This evidence is similar to the global adult (≥ 20 years) prevalence in low and middle-income countries (31.5%).^{1,6} Based on the primary health research survey year 2018, the prevalence of hypertension among people aged 18 years and over in Indonesia was 34.1%, which increased by about 8.3% from the previous five years.⁷ In the same survey, from 33 provinces of Indonesia, North Sulawesi (13.2%) was reported as the highest province with hypertension prevalence and Papua (4.4%) as the lowest.⁷

Moreover, Indonesia has around 8.97% of the elderly (23 million), where older women are more than men (9.47% compared to 8.48%).⁷ Indonesian elderly is also dominated by the 60 to 69-year age group, whose percentage reaches 5.65% of the Indonesian population.⁷ This elderly proportion, on the one hand, can indicate factors of the increasing quality of life of

people in Indonesia. On the other hand, it turns out to be a significant challenge due to the increasing number of degenerative diseases such as hypertension. Tangerang, as part of Banten province in Indonesia, had a prevalence of hypertension around 8.4% (> 18 years old) in 2018.⁸ Besides, the population of people above > 50 years old in Banten is 18.43 % in 2020.⁹

Binong district in Tangerang is a semi-urban area and is a working area of Puskesmas (Community Health Centre) Binong with nine Posbindu (Integrated Development Post for elderly). Posbindu is a Puskesmas program to provide health examination, education, and promotion for middle age and elderly in the community. Posbindu is managed by some voluntary community members in the area and working together with the staff of Puskesmas. Based on Puskesmas' health data in Binong, the most common non-communicable disease that occurs at Posbindu in Binong is hypertension,

with 2,141 cases.¹⁰ However, there have been limited numbers of studies on hypertension risk factors in the Binong community. Therefore, it is crucial to explore risk factors of middle age and elderly in Binong.

It is highly noted that stress cannot be eliminated in one's life, and stress might relate to hypertension prevalence^{6,11}, in which stress as a risk factor is being debated for its correlation with hypertension incidence. It is further expected that the empirical data on the risk factors will lead to the development of a health promotion program to improve the quality of life of middle age and elderly in Binong. This study aimed to identify the correlation between stress and hypertension in middle-aged and elderly at Posbindu in Binong Tangerang.

METHODS

This study was part of identifying hypertension and modifiable risk factors research series. Four other factors (body mass index/BMI, waist circumference/WC, physical activities, and diet) were reported in the other study report.¹² This study was a cross-sectional study using purposive sampling to recruit the respondents. The inclusion criteria of this study included age 45-74 years old, attending Posbindu to check their Blood Pressure (BP) and health examination. Exclusion criteria included examination of Blood Pressure (BP) < 120/80 mmHg which was obtained from 2 tests and did not have a history of hypertension. The population of this study was based on persons visiting ten Posbindu, with a total population of 225. The recruitments were located at nine Posbindu under a Community Health Centre (Puskesmas) in Binong Tangerang Indonesia. The target sample of this study was measured based on the population and Slovin's formula (145 target samples).

A modified questionnaire was established to measure the stress and smoking behavior of the respondents. The stress questionnaire consisted of 14 questions using a Likert scale: never, rarely (1-2x/month), sometimes (1-2x/week), and always (every day). The smoking behavior questionnaire comprised 11 questions related to smoking status, reasons

for smoking, smoking frequency, and the number of cigarettes. The questionnaire was tested for its validity and reliability to 30 respondents at one Posbindu outside of the sample. The Cronbach Alpha of the questionnaire was 0.816 (stress) and 0.947 (smoking behavior). Several questions were revised for their readability and meaning to improve their understanding of the respondents. Questionnaires with missing or incomplete data are not used for further analysis after being checked.

Moreover, two nurse educators examined two sphygmomanometers for their consistency using the Kappa test by examining three people with similar inclusion criteria for this study. Blood pressure measurements were carried out twice with an interval of five minutes. One of the two sphygmomanometers examined reliable with the Kappa test were fair-moderate (Systole 0.273; Diastole 0.455) and substantial (Systole 0.771; Diastole 0.8). Thus, this study used one reliable sphygmomanometer to measure the respondents' BP.

RESULTS

This study collected 151 questionnaires, but only 145 were completed. This study

recruited 145 respondents comprising 79 (54.5%) middle age and 66 (45.5%) elderly (Table 1). Most of the respondents were female (82.8%), and half were Sundanese (50.3%). Table 1 also showed that more than half of the respondents had a history of hypertension (61.4%), consumed anti-hypertensive medication (55.9%), and most of them routinely checked their BP with health care workers. Table 1 further revealed that most respondents had non-smoking behavior (82%), but half were at severe stress levels (57.2%).

Table 2 identified that half of the respondents were categorized as pre-hypertension (42.8-53.1%) in the first and second measurements of blood pressure. Moreover, this study reported a significant correlation between respondents' level of stress and their level of hypertension (Systole: p-value 0.047; r 0.167 & Diastole: p-value 0.033; r 0.18), as shown in table 3.

DISCUSSION

This study highlights that hypertension is prevalent among middle-aged and elderly in the Binong community, Tangerang. This current study also reveals that stress significantly correlates with an increased risk of hypertension

Table 1. Characteristics of The Respondents (n=145).

Characteristics	n	%	
Age	Middle age	79	54.5
	Elderly	66	45.5
Sex	Male	25	17.2
	Female	120	82.8
	Javanese	47	32.4
Ethnicity	Sundanese	73	50.3
	Batak	1	0.7
	Minangkabau	3	2.1
	Kalimantan	2	1.4
	Others	19	13.1
Hypertension history	Yes	89	61.4
	No	56	38.6
Consume Anti- hypertensive medication	Yes	64	44.1
	No	81	55.9
Routine BP measurement	Yes	124	85.5
	No	21	14.5
	Yes	13	8.9
Smoking Behavior	No	119	82.2
	Smoking history	13	8.9
	Mild	10	6.9
Stress	Moderate	52	35.9
	Severe	83	57.2

Table 2. Hypertension Level of The Respondents (n=145).

Hypertension level	First Measurement		Second Measurement	
	Systole n (%)	Diastole n (%)	Systole n (%)	Diastole n (%)
Normal with use of anti-hypertensive medication	4 (2.8)	22 (15.2)	6 (4.1)	19 (13.1)
Pre-Hypertension	62 (42.8)	75 (51.7)	65 (44.8)	77 (53.1)
Hypertension grade 1	59 (40.7)	36 (24.8)	59 (40.7)	39 (26.9)
Hypertension grade 2	20 (13.8)	12 (8.3)	15 (10.3)	10 (6.9)

Table 3. Stress for The Level of Hypertension (n=145).

Modifiable factors	First Measurement		Second Measurement	
	Systole p value (r)	Diastole p value (r)	Systole p value (r)	Diastole p value (r)
Stress	0.11 (0.13)	0.033* (0.18)	0.047* (0.167)	0.086 (0.14)

*Significant <0.05

in middle age and the elderly (p-value <0.05 for Diastole in the first and Systole in the second measurements). Some previous studies have reported that stress is associated with hypertension, while others were unsuccessful in reporting the relationship. Hu and colleagues supported that stress contributed 9.1% to the risk of hypertension in the total sample of middle-aged Chinese.¹¹ A study in Nigeria further showed stress as one of the positive predictors of hypertension, together with overweight, gender, and insufficient sleep.¹³ Women are more at risk for hypertension due to their stress at work or home.^{11,13} Moreover, stress activates the sympathetic nervous system and increases the heart's work, causing hypertension.¹⁴ A qualitative perspective of the stress experiences of the middle age and elderly in the community is recommended.

Stress is a condition that threatens homeostasis, and it will mobilize adaptive physiological and behavioral responses to maintain homeostasis.¹⁵ Psychosocial stress will induce hypertension by the hypothalamus-pituitary-adrenal (HPA) axis response.¹⁶ The first step in the HPA axis is releasing corticotropin-releasing factor (CRF) from the paraventricular nucleus of the hypothalamus.¹⁶ Binding CRF to receptors in the pituitary subsequently induces the release of adrenocorticotrophic hormone (ACTH) into the systemic circulation. As a result, the adrenal cortex stimulates the synthesis and release of glucocorticoids, which contributes to the development of hypertension.¹⁶

The pituitary gland also stimulates and releases the Vasopressin hormone, which causes fluid retention, constriction of blood vessels, and causes blood pressure elevation.¹⁷ The different stressors influence the release of Angiotensin II and the expression of its receptors in the brain and peripheral tissue. The action of Angiotensin II in the brain will mediate neurogenic hypertension.¹⁸

A systematic review by Liu et al. (2017) reported that psychosocial stress was related to an increased risk of hypertension (OR = 2.40, 95% CI = 1.65–3.49). In addition, hypertensive patients were more likely to experience psychosocial stress than normotensive patients (OR = 2.69, 95% CI = 2.32–3.11).¹⁶ This meta-analysis study suggested that chronic psychosocial stress may be a risk factor for hypertension, but further research is necessary to confirm this factor. On the other hand, a recent study in Malaysia reported that stress is not significantly related to hypertension.¹⁹ This study shows that age and BMI were correlated significantly with hypertension. Age, BMI, and physical activities were also related to Systolic and Diastolic Blood Pressure.¹⁹ This Malaysian study is limited to a bivariate analysis similar to this current study. There is a need for a multivariate study of hypertension in the community by controlling the confounding factors.

Smoking behavior is also claimed as one of the significant risk factors for hypertension. However, in this current study, only a small number of

respondents demonstrated smoking behavior, so it is difficult to analyze the relationship between smoking behavior and hypertension. Whether or not there is a relationship between hypertension levels and smoking habits is still being debated. Seow's study revealed that smokers were not significantly related to hypertension incidence (p 0.431).²⁰ Leone's study also argued that individual response to hypertension depended on the type and duration of smoking.¹⁶ It is also claimed that prolonged smokers usually produce lower blood pressure along with declining body weight and long-term nicotine effects.²¹

Moreover, though a cross-sectional study is helpful for public health planning, it is difficult to derive a causal relationship due to the simultaneous measurements. There might be confounding or other variables that have not been considered, which could interfere with the study results. Thus, the interpretation of the findings should be cautious. This study also employed a purposive sampling technique, in which the respondents may not represent the population. Therefore, generalizations should be considered carefully.

CONCLUSION

This study supports the correlation between stress levels and hypertension levels. It is recommended that nurses as educators should provide stress management training for middle age and elderly in the community, especially with hypertension. Further study should consider a qualitative perspective of the stress experiences of the middle age and elderly in the community as well as the significance of conducting a multivariate study by controlling other hypertension-related factors.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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ETHICS APPROVAL

The MRIN/Mochtar Riady Institute for Nanotechnology ethics committees approved this study (MRIN No 008/MRIN-EC/ECL/VI/2019), and all respondents completed written informed consent.

AUTHOR CONTRIBUTION

Ni Gusti Ayu Eka (NE), Martina Pakpahan (MP), and Maria Florensia (MF) developed and modified the study's protocol, design, and questionnaire. NE, MP, and MF gathered the data. NE and MP also contributed to the data analysis and interpretation. NE assisted in the manuscript's development. All authors provided constructive feedback and contributed to the development of the manuscript.

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