RESEARCH ARTICLE

Determinants of Hypertension in Outpatients in East Java, Indonesia

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Abstract

Objective: To assess the prevalence of hypertension and to identify the causative factors.

Method: The cross- cross-sectional study was conducted at Dr Soegiri Hospital, Lamongan, Indonesia, from March to July 2019, and comprised outpatients of either gender. Data was collected using a modified World Health Organisation STEPwise approach to surveillance questionnaire to identify the risk factors for hypertension. Data were analysed using the SPSS 16.0 statistical tool and logistic regression test.

Results: Of the 184 subjects, 118(64.1%) were females and 66(35.9%) were males, and 96(52%) were aged <60 years. Overall, 120(65.2%) subjects were hypertensive; 80(66.7%) females and 40(33.3%) males. The two main factors that significantly influenced the incidence of hypertension were body mass index (p=0.001) and consumption of vegetables (p=0.013). After adjusting for confounding factors, only body mass index was found to affect the incidence of hypertension (odds ratio: 5.61; 95% confidence interval: 1.686-18.659).

Conclusion: Body mass index and and dietary patterns affected the incidence of hypertension. After adjusting for confounding factors, only the former was found to have significant association with hypertension.

Keywords: Blood pressure, Body mass, Hypertension, Feeding, Dietary. (JPMA 73: S-113 [Suppl. 2]; 2023)

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Introduction

The increasing prevalence of hypertension (HTN) is a challenge to health systems because of causative and risk factors for cardiovascular and kidney diseases, and has been identified as the cause behind death due to disability, premature death, and disability-adjusted life years (DALYs).[1,2]

The World Health Organisation (WHO) estimated that 42% adults have diagnosed HTN and the treatment targets to bring down the level to 33% between 2010 and 2030.[3] Reports in 2000 showed spike in HTN prevalence in low- and middle-income countries (LMICs), but the prevalence rate has been stable or has gone down in the developing middle-income countries (MICs).[4] HTN is a preventable disease associated with lifestyle, including smoking, physical activity and alcohol consumption.[5] HTN is generally asymptomatic and goes unnoticed, but sometimes patients report dizziness, headache, nosebleed, chest pain and palpitations.[6]

The HTN incidence is in line with trends related to increasing age span and life expectancy. After diabetes mellitus (DM), HTN is the other major risk factor and the cause of increase in the incidence of end-stage renal disease (ESRD).[7,8] Uncontrolled HTN causes stroke, heart failure (HF) and chronic kidney disease (CKD).[9,10] Epidemiological investigations are very useful in predicting risk factors and planning primary or secondary prevention strategies for the occurrence of disease complications.[11,12]

The HTN prevalence differs among countries and among regions within the countries. Different regulations are needed to assess HTN prevalence and risk factors. The fourth Indonesian Family Life Survey (IFLS-4) in 2007 found that 47.8% adult population aged >40 years had HTN.[13,14] A national population-based survey in Malaysia showed that HTN prevalence was 43.5% (≥30 years; 2011), while in Myanmar it was 30.1% (aged 15-64 years; 2009).[15,16] Epidemiological investigations of HTN are important in formulating health policy planning for academics and health workers.[7,17]

According to the Ministry of Health, HTN incidence in Indonesia increased in 2018 by 31.6% in people aged 25-44 years, 20.1% in those aged 25-34 years, and 13.2% in those aged 18-24 years compared to 2013. In fact, there was increase across all age groups. The lowest prevalences were in Papua (22.2%) and the highest in South Kalimantan (44.1%). In East Java, HTN prevalence was 36.3%, which was above the national average.[18,19] The Lamongan District Health Office reported HTN prevalence in 2018 to be 34.7%.[20] Besides, HTN was among the top 10 diseases in 2016-18 noted at Dr Soegiri Hospital in Lamongan, and there were cases of resistant HTN and HTN crisis.

Detailed databases covering all aspects of HTN

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prevalenceare needed to form an informed strategy for HTN control.[21,22] HTN risk factors are age, smoking habits, alcoholism and obesity,[23] while lifestyle elements are the trigger factors.[24,25]

The current study was planned to assess the prevalence of HTN and to identify the causative factors.

Patients and Methods

The cross-sectional study was conducted at Dr Soegiri Hospital, Lamongan, Indonesia, from March to July 2019. After approval from the ethics review committee of Universitas Muhammadiyah, Lamongan, the sample was raised using consecutive sampling technique.

After taking written informed consent from all the participants, data was collected using the modified WHO STEPwise approach to surveillance (STEPS) questionnaire.[26] The STEPS instrument is used to measure risk factors for non-communicable diseases and can be adjusted as needed. The modified STEPS consists of three aspects: demographics, habits, and physical conditions. The measurement parameters include gender, age, medical history, body mass index (BMI), HTN status, medication management, and referral management. BMI was calculated and categorised as per the standard formula.[27] Blood pressure (BP) was measured directly using a calibrated sphygmomanometer and readings were also taken from medical records.

Inclusion criteria applied were patients with hypertension for more than two years, being able to read and write and providing informed consent. Meanwhile, respondents who were diagnosed with mental disorders and had comorbidities were excluded.

Data were analysed using the SPSS 16.0 statistical tool and logistic regression test. Chi-square was used to determine the related risk factors with HTN incidence. Logistic regression test provided the odds ratio (OR) describing HTN probability risk factors.

Results

Of the 184 subjects, 118(64.1%) were females and 66(35.9%) were males. The characteristics of the sample were noted in detail (Table 1).

There were 96(52%) subjects aged <60 years, and, overall, 120(65.2%) subjects were hypertensive; 80(66.7%) females and 40(33.3%) males. The two main factors that significantly influenced HTN incidence were BMI (p=0.001) and consumption of vegetables (p=0.013) (Table 2).

After adjusting for confounding factors, only BMI was found to affect HTN incidence (OR: 5.61; 95% confidence interval [CI]: 1.686-18.659), meaning patients with BMI >25.66 kg/m^2 carried 5.6 times more HTN risk than those with BMI <25.66kg/m^2 (Table 3).

Table- 1: Distribution based on characteristics of outpatients, body mass index (BMI), duration of smoking, frequency of smoking, dietary patterns (n=184).

Characteristics	n (%)	Min-Max
Gender		
Female	118 (64,1)	
Male	66 (35,9)	
Education		
Not educated	2 (1,1)	
Elementary School	38 (20,7)	
Junior high School	48 (26,1)	
Senior high School	62 (33,7)	
Higher education	34 (18,5)	
Job status		
Housewives	100 (54,3)	
Retired	24 (13,0)	
Self employees	44 (23,9)	
Private employees	10 (5,4)	
Civil servants	4 (2,2)	
Unemployment	2 (1,1)	
Smoking habits		
Never smoked	120 (65,2)	
Current smoker	44 (23,9)	
Ex-smoker	20 (10,9)	
Incidence of hypertension		
Hypertension	120 (65,3)	
No hypertension	64 (34,7)	
Characteristics	**Mean + SD**	
Body Mass Index (BMI)		
Height (m)	1,57 + 0,08	1,45-1,75
Weight (kg)	63,65 + 11,84	37,00-90,00
BM (kg/m^2)	25,66 + 3,77	17,60-37,78
Duration of smoking (year)		
Current smoker	32,73 + 8,65	15-50
Ex-smoker	41,91 + 5,33	33-49
Frequency of smoking (cigarettes/day)		
Current smoker	25 + 7,51	0-37
Ex-smoker	23 + 6,01	17-25
Diets of fruits and vegetables (times/week)		
Fruit diet	1,13 + 0,37	1-3
Vegetable diet	2,19 + 0,43	1-3

Tabl- 2: Bivariate analysis related to incidence of hypertension (n=184)

Risk Factors	The Incidence of Hypertension		*p*-value
	Not hypertension	Hypertension	
Age (years)			
≤ 60	28	68	0,236
> 60	36	52	
Gender			
Male	26	40	0,486
Female	38	80	

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Table 2: *continued from previous page*

Risk Factors	The Incidence of Hypertension		*p*-value
	Not hypertension	Hypertension	
Educational Level			
Not educated	2	1,1	0,082
Elementary School	38	20,7	
Junior high School	48	26,1	
Senior high School	62	33,7	
Higher education	34	18,5	
Job-status			
Housewives	30	70	0,229
Retired	10	14	
Self-employed	16	28	
Private employees	2	8	
Civil servants	4	0	
Unemployment	2	0	
Body Mass Index (BMI)			
≤ 25.66 kg/m^2	48	36	0,000
> 25.66 kg/m^2	16	84	
Habits of smoking			
Never smoker	42	78	
Current smoker	14	30	0,902
Ex-smoker	8	12	
Diets of fruits			
≤ 1 time/week	60	102	0,218
> 1 time/week	4	18	
Diets of Vegetables			
≤ 2 time/week	60	86	0,013
> 2 time/week	4	34	

factors for HTN, metabolic syndrome, vascular wall abnormalities, endothelial dysfunction and ventricular hypertrophy can trigger increase in BMI.[30,31] The significant increase in obesity prevalence recommends BMI as a tool to predict and detect HTN.[29,32]

Smoking habits did not affect HTN incidence in the current study even after the confounding factor model was adjusted. The finding differs from previous studies in this regard.[33-36]

The characteristics and location of the sample may have been the cause of difference in findings. Also, the cross-sectional design of the current study could not explain the causal relationship among the risk factors.[10]

A study on dietary habits related to fruits found that it had no effect on HTN incidence before or after adjusting the analysis model for confounding factors.[31] Only a progressive increased consumption of whole fruits can reduce HTN risk.[37] The consumption of vegetables is the same as the consumption of fruits.[10,36,38]

The limitation of the current study is that the sample size was not calculated which could have influenced the power of the study.

Conclusion

BMI and dietary patterns affected NTN incidence. After adjusting for confounding factors, only the former was found to have significant association with HTN.

Table 3: Multivariate analysis with logistic regression test on the causative factors of hypertension (n=184)

Risk Factors	Incidence of Hypertension		OR (CI 95%)	
	No Hypertension	Hypertension	Unadjusted	Adjusted
Body Mass Index (BMI)				
≤ 25.66 kg/m^2	48	36	1	1
> 25.66 kg/m^2	16	84	7 (2,648-18,506)	5,610 (1,686-18,659)
Habits of smoking				
Never smoker	42	78	1	1
Current smoker	14	30	1,153 (0,406-3,271)	4,206 (0,546-32,337)
Ex-smoker	8	12	0.807 (0,204-3,184)	3,903 (0,390-39,051)
Diet of fruits				
≤ 1 time/week	60	102	0,377 (0,075-1,865)	1,412 (0,241-8,286)
> 1 time/week	4	18	1	1
Diet of vegetables				
≤ 2 time/week	60	86	0,168 (0,35-0,784)	2,617 (0,472-14,491)
> 2 time/week	4	34	1	1

Discussion

Overweight and obese people carried more HTN risk, which is In line with previous studies.[28,29]

Heart rhythm increases as the body mass increases. The significant increase in arterial wall pressure also causes an increase in the circulating blood volume throughout the body to meet the needs for oxygen and nutrients. Risk

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