

RESEARCH ARTICLE

Factors associated with hypertension in women of childbearing age

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Abstract**Objective:** To investigate factors associated with hypertension in women of childbearing age.**Method:** The correlational, cross-sectional study was done in Madiun, East Java, Indonesia, in August 2021 after approval from the Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia. The sample comprised women of childbearing age who were married and not pregnant. Data was collected using questionnaires, while blood pressure, height and weight of the subjects were measured and noted. Data were analysed using Spearman Rho test.**Results:** Of the 311 subjects with mean age 32.06 ± 7.10 years, 184(59.2%) were housewives; 153(49.2%) had studied up to the Senior High School level; 166(53.38%) were overweight; 157(50.48%) had family history of hypertension; 99 (31.83%) were exposed to cigarette 1-2 hours a day; 141(45.34%) were using hormonal contraception for >2 years; 94(30.23%) had low physical activity; 148 (47.59%) had high sodium consumption; and 139(44.69%) consumed coffee 2-3 cup/day. Hypertension prevalence was 123(39.55%). BMI ($r=0.750$), family history ($r=0.763$), exposure to cigarette smoke ($r=0.755$), physical activity level ($r=-0.806$), and sodium ($r=0.505$) were significantly associated with hypertension ($p<0.05$). Hormonal contraception ($r=0.271$) and coffee consumption ($r=0.127$) had a weak association with hypertension incidence ($p>0.05$).**Conclusion:** Risk of hypertension in women increased for those with high body mass index, family history, high exposure to cigarette smoke, and high sodium intake.**Keywords:** Hypertension, cigarette smoke, hormonal contraception, obesity, sodium(JPMA 73: S-109 [Suppl. 2]; 2023) DOI: <https://doi.org/10.47391/JPMA.Ind-52-26>**Introduction**

Hypertension (HTN) is an important risk factor for advanced cardiovascular disease in women, but it is often underestimated and under-diagnosed. The HTN rate in Indonesia reached 63.3 million, 34.11% of the population, in 2018, including an increase in the number of HTN cases in women of childbearing age¹ who normally have protective hormones against cardiovascular disease. Cardiovascular disease is the cause of premature death with the highest prevalence of 35%.² Indonesia Basic Health Research data showed that the prevalence of hypertension in 2013 was 25.5% and increased to 34.11% in 2018.¹ The HTN prevalence in women was 36.85%, higher than men (31.34%) in the same age range (≥ 18 years).³ HTN prevalence in women of childbearing age in Madiun Regency was 7,300 people (19.9%).⁴ The average blood pressure (BP) in women of childbearing age considered HTN is 130mmHg for systolic BO (SBP) and 80mmHg for diastolic blood pressure (DBP)².

Studies stated that obesity was associated with HTN due to

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the increased insulin resistance, hyperinsulinaemia, increased cardiac output, levels of triglycerides (TG) and platelets, and activity of the sympathetic nervous system.⁵⁻⁹ The nicotine content in cigarettes and cigarette smoke causes a stimulus to the hormone epinephrine (adrenaline) which drives an increase in heart rate.¹⁰ Increased BP can also occur due to hormonal balance disorders during the use of hormonal contraceptives, as well on account of less physical activity, high sodium intake and caffeine consumption.¹⁰⁻¹⁶

HTN in women can cause a range of complications that may greatly affect their life. The current study was planned to investigate factors associated with HTN in women of childbearing age.

Subjects and Methods

The correlational, cross-sectional study was done in Madiun, East Java, Indonesia, in August 2021 after approval from the Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia. The independent variables in this study were body mass index (BMI) (healthy BMI: $17-23\text{kg/m}^2$)¹⁷, family history of HTN, exposure to cigarette smoke/day (almost no exposure to <1 hour exposure/day), the usage duration of hormonal contraception

(recommended limit: ≤ 5 years), sodium intake/day (normal limits: ≤ 2000 mg or ≤ 1 tsp/person/day), physical activity (600 metabolic equivalent of task [METs] to 3000 METs mins/week), and coffee consumption. The dependent variable was HTN (normal SBP: 90-129mmHg; normal DBP: 70-80mmHg)¹⁷.

The sample size was calculated using Slovin's method.¹⁸ Those included were women of childbearing age who were married and not pregnant. The sample was raised using cluster sampling technique, taking potential subjects from three villages by dividing the number of women of childbearing age in each village by the population and multiplied by the result of the total sample size count. Informed consent was obtained from all the subjects. Those who did not want to participate were excluded.

Data was collected using questionnaires for basic demographics, family history of hypertension (One question about hypertension status in participant's parents), exposure to cigarette smoke,¹⁹ hormonal contraception,¹¹ International Physical Activity Questionnaire-Short Form (IPAQ-SF) for physical activity,²⁰ sodium intake, and coffee consumption.²¹ All questionnaires have been used in other studies and have been tested for validity and reliability in these studies.^{11,19-21} All questionnaires had validity and reliability index ≥ 0.70 . BMI was measured using height and weight scales. BP to identify HTN was measured using a spectrum aneroid sphygmomanometer.

The average time for the respondents to fill out the questionnaires and to have a physical examination was about 30 minutes.

Data was analysed using Spearman Rho test with a significance level of $p=0.05$.

Results

Of the 311 subjects with mean age 32.06 ± 7.10 years, 184(59.2%) were housewives and 153(49.2%) had studied up to the Senior High School level (Table 1)

Besides, 166(53.38%) were overweight or obese; 157(50.48%) had family history of HTN; 99 (31.83%) were exposed to cigarette 1-2 hours a day; 141(45.34%) were using hormonal contraception for >2 years; 94(30.23%) had low physical activity; 148 (47.59%) had high sodium consumption; and 139(44.69%) consumed coffee 2-3 cup/day. Hypertension prevalence was 123(39.55%) (Table 2).

BMI ($r=0.750$), family history ($r=0.763$), exposure to cigarette smoke ($r=0.755$), physical activity level ($r=-0.806$), and sodium ($r=0.505$) were significantly associated with HTN ($p<0.05$). Hormonal contraception ($r=0.271$) and coffee

consumption ($r= 0.127$) had a weak association with HTN incidence ($p>0.05$).

Table-1: Basic demographics of the study subjects.

No.	Demographic Data	n (%)	Mean \pm SD
1	Age range (years)		
	20-34	206 (66.2)	
	35-49	105 (33.8)	32.06 \pm 7.10
	Total	311 (100)	
2	Level of education		
	Elementary	52 (16.72)	
	Junior high	88 (28.30)	- \pm -
	Senior high	153 (49.20)	
	Diploma	10 (3.22)	
	Bachelor	8 (2.57)	
	Total	311 (100)	
3	Income based on regional wages standard		
	Unemployed	184 (59.2)	
	\leq USD 133.53/month	97 (31.2)	- \pm -
	$>$ USD 133.53/month	30 (9.6)	
	Total	311 (100)	
4	Working status		
	Housewife	184 (59.2)	
	Entrepreneur	108 (34.7)	- \pm -
	Civil servant	19 (6.1)	
	Total	311 (100)	

SD: Standard deviation, USD: United States dollar.

Table-2: Independent and dependent variables of the study subjects.

No.	Variables	n (%)	Mean \pm SD
1	BMI (Body Mass Index)		
	Underweight (< 17 kg/m ²).	3 (1.0)	
	Healthy weight (17-23 kg/m ²).	142 (45.7)	24.55 \pm 5.38
	Overweight (23-27 kg/m ²).	95 (30.5)	
	Obese (> 27 kg/m ²).	71 (22.8)	
	Source: Ministry of Health Republic Indonesia, 2013 ¹⁷		
	Total	311 (100)	
2	Family history of hypertension		
	No family history.	154 (49.5)	
	With family history	157 (50.5)	- \pm -
	Total	311 (100)	
3	Cigarette smoke exposure		
	Almost no exposure to <1 hr exposure/day	98 (31.5)	
	1-10 stick/day and 1-2 hr exposure/day	114 (36.7)	10.15 \pm 5.00
	> 10 stick/day and > 2 hr exposure/day	99 (31.8)	
	Total	311 (100)	
4	Hormonal contraception		
	Not using hormonal contraception	72 (23.2)	
	Using 3 months—1 year	29 (9.3)	2.62 \pm 1.15
	Using 1.1-2 years	69 (22.2)	
	Using >2 years	141 (45.3)	
	Total	311 (100)	
5	Physical activities		
	High (>3000 METs-mins/week).	51 (16.4)	

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Table 2: continued from previous page

No.	Variables	n (%)	Mean±SD
	Moderate (600 METs—3000 METs- mins/week).	166 (53.4)	1695.27±1051.38
	Low (<600 METs- mins/week).	94 (30.2)	
	Total	311 (100)	
6	Sodium consumption		
	Normal (≤2000 mg/day or equivalent to ≤1 tsp/person/day).	163 (52.4)	1963.83±750.33
	High (>2000/day mg or equivalent to ≥1 tsp/person/day).	148 (47.6)	
	Total	311 (100)	
7	Coffee consumption		
	0-1cup/day	119 (38.26)	2.25±1.73
	2-3 cup/day	139 (44.69)	
	> 3 cup/day	53 (17.04)	
	Total	311 (100)	
8	Hypertension		Systole: 125.52
	Normal (systole: 90—129 mmHg and diastole: 70—80 mmHg).	188 (60.45)	Diastole: 82.06 ±
	Hypertension (systole: 130-200 mmHg or diastole: 81-120 mmHg).	123 (39.55)	Systole: 19.83 Diastole: 14.94
	Total	311 (100)	

SD: Standard deviation.

Discussion

The findings indicated that all the dependent variables in the study had a correlation with HTN incidence. The correlation between BMI and HTN incidence has also been reported earlier.⁶ One study argued that body fat affects BP by several mechanisms, including insulin resistance (IR), which results in the greater release of fatty acids caused by HTN and other mechanisms, and the release of adipokines, such as leptin, can increase the sympathetic outflow.²² Increasing body weight increases the need for blood to supply oxygen to body tissues. An increase in the volume of blood in circulating blood vessels increases the pressure of blood on the walls of the arteries, resulting in higher BP or HTN.¹⁰

The current results indicated there was a relationship between family history and HTN in women of childbearing age. This is in line with literature.^{10,23} Besides, genetic factors contribute 30-50% to BP variations.²⁴

The current result about cigarette smoke exposure corresponded with earlier research as well which revealed that the exposure doubled HTN risk.^{10,25} The current study supported earlier findings that low physical activity increased HTN risk in women by eight times.^{10,26}

Similar to the current study, a study found a weak correlation between hormonal contraceptives on SBP and DBP.²⁷ The finding about sodium intake is also supported by previous research.^{10,28} The nutritional adequacy rate for

energy consumption for women of childbearing age (15-49 years) ranges 2,125-2,150 kcal, the fat adequacy rate is 71-60g and sodium adequacy is 1,500mg. Sodium intake of 2.4g/day is considered high.²⁹ Sodium consumption causes high BP due to increased plasma volume and cardiac output, inappropriate reticular activating system (RAS) function, and activation of the sympathetic nervous system¹⁵.

Contrary to the findings about coffee consumption in the current study, Navarro et al.¹⁶ reported that women who consumed regular coffee were associated with a 26% lower HTN risk. However, another study supported the current findings, reporting that caffeine in the body takes over the adenosine receptors in nerve cells, which triggers the production of hormone adrenaline and increases BP³⁰. The limitation of the current study is that it did not control activities, consumption of food or drugs by the respondents before measuring BP, which can change with different measurement times and places since the body condition, stress level, activity and rest are variables.

Conclusion

HTN risk in women of childbearing age increased for those with high BMI, family history, high exposure to cigarette smoke, and high sodium intake. Higher physical activity level led to a lower HTN risk. Though the use of hormonal contraception and high consumption of sodium and coffee were associated with HTN risk, the relationship was weak.

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