The Correlation Between the Type of Occupation Toward Blood Pressure and Cholesterol Levels in Individuals with Hypertension

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A B S T R A C T

Daily activities and occupation can significantly influence health conditions, so a health assessment related to occupational factors is essential to reduce the risk of the disease. One of the leading causes of mortality from cardiovascular disease worldwide is hypertension. This study aims to determine the correlation between the type of occupation toward blood pressure and cholesterol levels in individuals with hypertension. This paper was an analytical observational study with a cross-sectional approach. The population was individuals with hypertension at Depok 2 Public Health Centre, Sleman Regency, Special Region of Yogyakarta. In addition, the sample was 121 respondents with consecutive sampling. The independent variable was the type of occupation, and the dependent variables were blood pressure and cholesterol levels. Instruments were a questionnaire to evaluate the characteristics of respondents and the type of occupation, a digital sphygmomanometer to examine blood pressure, and cholesterol test kits to assess cholesterol levels. The data analysis used the Chi-Square test with $\alpha=0.05$. Most respondents were female (59.5%) and aged 60-69 years old (47.1%). They worked in the informal sector (81.2%). In addition, they had grade 1 hypertension (52.1%). There was no significant correlation between the type of occupation and blood pressure in individuals with hypertension ($p=0.248$). In addition, most respondents had high cholesterol levels (50.4%). Furthermore, there was no significant association between the type of occupation and cholesterol levels in individuals with hypertension ($p=0.128$). In conclusion, the type of occupation is not a risk factor for increased blood pressure and cholesterol levels in individuals with hypertension.

INTRODUCTION

Hypertension is the leading cause of death from cardiovascular disease worldwide (Zhou *et al.*, 2018). In 2019, hypertension patients aged 30-79 reached 626 million women and 652 men (Zhou *et al.*, 2021). In Indonesia, hypertension has become one of the health problems in non-communicable diseases commonly found in the community (Balgis and Sumardiyono, 2019). Based on data from Basic Health Research in 2013, hypertension in Indonesia reached 25.8% population. Furthermore, its prevalence increases in young people (Balgis and Sumardiyono, 2019). Some risk factors for hypertension include an unhealthy diet consisting of a diet high in sodium and low in potassium, obesity, alcohol consumption, and lack of physical activity (Mills, Stefanescu, and He, 2020).

Based on Basic Health Research in 2018, hypertension in the Special Region of Yogyakarta reached 11.01% of the population, higher than the national prevalence (8.8%) (Dinas Kesehatan Yogyakarta, 2021). The estimated number of hypertension patients in the DI Yogyakarta province aged 15 years was 210,112 cases in 2020 (Dinas Kesehatan Yogyakarta, 2021). A survey in Indonesia found several risk

factors for hypertension, such as age, obesity, education level, lack of fruit and vegetable consumption, lack of physical activity, and anxiety levels. (Defianna *et al.*, 2021).

Hypertension can lead to stroke, coronary heart disease, and heart and kidney failure (Nugroho and Fahrurodzi, 2020). One factor predisposing hypertension is cholesterol levels (Ulfah, Sukandar, and Afiatin, 2017). Usually, cholesterol is essential to form corticosteroids, sex hormones, and bile acids (Ulfah, Sukandar, and Afiatin, 2017). However, high cholesterol levels can interfere with vascular endothelial function by reducing vasodilating ability and causing blockage of the blood vessel walls (Otsuka *et al.*, 2015). In addition, increased cholesterol levels can cause insulin resistance and increased catecholamine levels. Then, it results in hyperinsulinemia (Mahmuda *et al.*, 2018). Increased catecholamines will interfere with the renin-angiotensin-aldosterone system, which controls blood pressure (Mahmuda *et al.*, 2018). As a result, there is an increase in vasoconstriction and fluid and salt retention in the body, developing into hypertension (Mahmuda *et al.*, 2018).

Daily activities and occupation can significantly influence health conditions, so a health assessment related to occupational factors is needed to reduce the risk of the disease (Stanaway *et al.*, 2018). According to a systemic analysis based on the Global Burden Study from 2007 to 2017, there was an increase in metabolic factors associated with socioeconomic status (Stanaway *et al.*, 2018). Socioeconomic status can influence biological, psychosocial, and behavioral factors that increase the risk of cardiovascular and metabolic diseases. Lower socioeconomic status predisposes poorer health outcomes (Schultz *et al.*, 2018). In addition, an increasingly heavy workload with low levels of physical activity can increase the risk of cardiovascular disease, especially in workers with low cardiorespiratory fitness (Holtermann *et al.*, 2016). Occupational not following the body's circadian rhythm can also increase the risk of cardiometabolic disease. Thus, it is necessary to analyze occupations that potentially pose the illness (Berkman *et al.*, 2015). This study aims to determine the correlation between the type of occupation toward blood pressure and cholesterol levels in individuals with hypertension at Depok 2 Public Health Centre, Sleman Regency, Special Region of Yogyakarta.

METHOD

This paper was an analytical observational study with a cross-sectional approach. The population was individuals with hypertension at Depok 2 Public Health Centre, Sleman Regency, Special Region of Yogyakarta. In addition, the sample was 121 respondents with consecutive sampling. The inclusion criteria were more than 20 years old, communicating well in Indonesian in writing or orally, and signing informed consent. Meanwhile, the exclusion criteria were sick or hospitalized individuals and respondents with an inadequate diet. This research received ethical approval from the Ethical Committee of Universitas Islam Indonesia with certificate 28/Ka.Kom.Et/70/K.E./Xll/2020. The independent variable

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was the type of occupation, and the dependent variables were blood pressure and cholesterol levels. Instruments were a questionnaire to evaluate the characteristics of respondents and the type of occupation, a digital sphygmomanometer to examine blood pressure, and cholesterol test kits to assess cholesterol levels. The classification of hypertension based on the Joint National Committee was prehypertension (120-139/80-89 mmHg), grade 1 hypertension (140-159/90-99 mmHg), and grade 2 hypertension (160-179/100-110 mmHg) (Chobanian *et al.*, 2003). In addition, cholesterol levels classification was normal (total cholesterol<200 mg/dL), borderline (200-240 mg/dL), and high (≥240 mg/dL) (National Cholesterol Education Program (US). Expert Panel on Detection, 2002). This study categorized normal and borderline total cholesterol as normal cholesterol levels. Then, the data analysis used the Chi-Square test with α=0.05.

RESULT

Characteristics of respondents

Table 1 indicates that almost half of the respondents are 60-69 years (47.1%). In addition, most respondents are female (59.5%).

Table 1. Characteristics of respondents

Characteristics of respondents		Frequency (Percentage)
Age	20-29 years old	1 (0.9%)
	30-39 years old	1(0.9%)
	40-49 years old	11 (9%)
	50-59 years old	24 (19.8%)
	60-69 years old	57 (47.1%)
	70-79 years old	23 (19%)
	80-89 years old	4 (3.3%)
Sex	Male	49 (40.5%)
	Female	72 (59.5%)

Most respondents worked in the informal sector (81.2%). In addition, they had grade 1 hypertension (52.1%). Respondents who worked in the informal sector mostly had grade 1 hypertension (38.8%). In addition, respondents who worked in the formal sector also mostly had grade 1 hypertension (13.2%). Thus, there was no significant correlation between the type of occupation and blood pressure in individuals with hypertension (*p*=0.248) (Table.2).

Table 2. The bivariate analysis between the type of occupation and blood pressure in individuals with hypertension

The type of occupation	Blood Pressure			Total	*p*
	Pre-Hypertension	Grade 1 hypertension	Grade 2 hypertension		
Formal sector	5 (4.1%)	16 (13.2%)	3 (2.5%)	24 (19.8%)	0.248
Informal sector	26 (21.5%)	47 (38.8%)	24 (19.8%)	97 (81.2%)	
Total	31 (25.6%)	63 (52.1%)	27 (22.3%)	121 (100%)	

Most respondents had high cholesterol levels (50.4%). Respondents who worked in the formal sector mostly had normal cholesterol levels (10.7%). Meanwhile, respondents who worked in the informal

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sector mostly had high cholesterol levels (50.4%). However, there was no significant correlation between the type of occupation and cholesterol levels in individuals with hypertension (p=0.128) (Table.3).

Table 3. The bivariate analysis between the type of occupation and blood pressure in individuals with hypertension

Occupation	Cholesterol Levels		Total	p
	Normal	High		
Formal sector	13 (10.7%)	11 (9.1%)	24 (19.8%)	0.128
Informal sector	36 (29.8%)	61 (50.4%)	97 (80.2%)	
Total	49 (40.5%)	72 (59.5%)	121 (100%)	

DISCUSSION

This study found that most respondents were female and aged 60-69 years old (Table 1). Prior research also revealed that individuals with hypertension were female and more than 60 years old (Ulfah, Sukandar, and Afiatin, 2017; Umar and Mariana, 2021). Women have a higher risk of hypertension and hypercholesterolemia and a higher risk of mortality due to cardiovascular disease than men (Colafella and Denton, 2018). Moreover, women after menopause will have an increased risk of hypertension and hypercholesterolemia due to decreased hormone estrogen. Thus, women need special attention as a risk factor for cardiovascular disease, especially postmenopausal women (Agarwala *et al.*, 2020).

Our findings indicated that most respondents worked in the informal sector (Table 2). Several work conditions can increase risk factors for hypertension in workers (Ribeiro Junior and Fernandes, 2020). A study by Hrehova and Ziara (2021) of 16,713 workers from various countries in the European Union found that work-related factors such as level of satisfaction, opportunity to develop new skills, adequate salary, and gain recognition from the workplace were associated with the incidence of hypertension (Hrehova and Ziaran, 2021). In addition, the type of work is a predisposing factor for metabolic syndrome (Sara *et al.*, 2018). In a study by Cho and Koo (2018), women with informal jobs had a higher prevalence of metabolic syndrome, regardless of differences in the characteristics of age, smoking, drinking habits, physical activity, body mass index, levels of stress or depression (Cho and Koo, 2018). Research conducted by Mello et al. (2021) also showed that informal employment with active smoking habits had a more significant prevalence of cardiovascular disease than the formal workgroup, unemployed, homemakers, and students (Mello *et al.*, 2021). Detecting occupational disease is essential to evaluate job safety and quality of life in daily activities (Halshka *et al.*, 2021).

In addition, most respondents in this paper had grade 1 hypertension (Table 2). Hypertension is a risk factor for cardiovascular diseases such as coronary heart disease and stroke. In addition, high systolic and diastolic blood pressure in individuals with hypertension affects poor health outcomes. (Hussain *et al.*, 2016; Flint *et al.*, 2019). In addition, a study by Junior and Fernandes (2020) showed that inadequate

physical activity (once per week or not at all) was a risk of high blood pressure. Furthermore, other risk factors were male, overweight, and aged more than 31 years (Ribeiro Junior and Fernandes, 2020).

Furthermore, this research indicated that most individuals with hypertension had high cholesterol levels (Table 3). Cholesterol levels in hypertension can affect endothelial function. When cholesterol levels increase, it will cause an inflammatory reaction by macrophages and endothelial dysfunction of blood vessels, resulting in damage to target organs such as the heart and brain (Zhou *et al.*, 2016). In addition to the damage to endothelial function, high cholesterol levels can increase the regulation of the hormone angiotensin I and increase the release of angiotensin II, which interacts with cholesterol through macrophages, leading to the accumulation of foam cells (Borghi, Urso, and Cicero, 2017). Thus, managing blood pressure and cholesterol levels can reduce the risk of cardiovascular disease (Gupta *et al.*, 2018). However, a study by Saputra et al. (2019) showed no association between cholesterol levels and blood pressure (Saputra *et al.*, 2019).

Our findings found no significant correlation between the type of occupation and blood pressure in individuals with hypertension (Table.2). It is in line with a study by Chasanah and Syarifah (2017). The study showed no correlation between work on the severity of hypertension (Chasanah and Syarifah, 2017). However, the findings of Rengganis et al. (2020) showed that stress levels at work increased blood pressure in workers (Rengganis, Rakhimullah, and Garna, 2020). Several work-related factors, such as overwork, a decreased number of employees, and an unfavorable work environment, also could affect increasing blood pressure (Trudel *et al.*, 2016). Work-related hypertension is multifactorial, so further monitoring is crucial to prevent hypertension (Munakata, 2018) (Bistara and Kartini, 2018).

This paper also revealed no significant correlation between the type of occupation and cholesterol levels in individuals with hypertension (Table.3). It is in line with a meta-analysis by Nyberg et al. (2013). The meta-analysis revealed no association between job strain and blood lipids. However, a study by Hansun et al. (2017) showed an association between work and the risk of cardiovascular disease, one of which was due to high cholesterol levels (Nyberg *et al.*, 2013; Hanson *et al.*, 2017). The unbalanced work potentially results in poor health outcomes, especially hypercholesterolemia (Schmidt *et al.*, 2015). The effect of occupation on cholesterol levels is multifactorial. Thus, assessing risk factors and managing work-related hypercholesterolemia is essential (Hwang and Lee, 2014).

This study has several limitations. One of them was limited samples due to the short duration of the study. In addition, this paper did not include other essential variables, including body mass index, physical activity, diet, educational level, and stress.

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CONCLUSION

In conclusion, the type of occupation is not a risk factor for increased blood pressure and cholesterol levels in individuals with hypertension. Further research could evaluate work-related factors such as stress levels and social security such as insurance toward blood pressure and total cholesterol levels in individuals with hypertension.

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