

Analysis of the Effect of Hypertension Prevention Program on Hypertension Status Among Workers in Manufacturing Companies in Semarang

Hanifah Septiasary, Hanifa Maher Denny, Yuliani Setyaningsih

Universitas Diponegoro, Indonesia

Email: septiasa.hani17@gmail.com, hanifadenny@live.undip.ac.id,
joeliani_kesja_undip@yahoo.com

ABSTRACT

Hypertension is a leading non-communicable disease-causing mortality and reducing employee productivity. Its high prevalence in the workplace is linked to lifestyle factors and low awareness of prevention. This study aimed to analyze the effect of hypertension prevention programs on employee awareness and hypertension status in animal feed companies in Semarang. A quasi-experimental design with pre-test and post-test control groups was employed. From a population of 257 employees, 30 samples were selected for each group. Data were collected via questionnaires and observation sheets. The intervention consisted of a hypertension prevention program including *sosialisasi* (socialization) about hypertension prevention and routine blood pressure monitoring. Data analysis used paired t-tests and Wilcoxon tests. Sixty subjects participated, with mean ages of 43.87 years (intervention) and 40.23 years (control). In the intervention group, 60% had a family history of hypertension. Significant improvement in awareness was observed in the intervention group ($p = 0.000$) but not in the control group ($p = 0.493$). The intervention significantly reduced systolic ($p = 0.000$) and diastolic ($p = 0.012$) blood pressure and lowered hypertension prevalence from 63.3% to 40%, whereas the control group showed no change. In conclusion, workplace hypertension prevention programs effectively increase employee awareness and reduce blood pressure and hypertension prevalence. These programs are recommended as preventive strategies in occupational health management.

Keywords: Hypertension, Prevention, Work Environment, Health Programs

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INTRODUCTION

The rapid development of industry encourages increased use of machinery, work equipment, and chemicals in production processes (Rüßmann et al., 2015). Advances in science and technology facilitate production efficiency, enhance work productivity, and raise workforce numbers. However, this growth often brings occupational health and safety problems. Employee health is a crucial factor in improving productivity, directly impacting company profitability. Health issues within the workforce cause losses to business operations, particularly through decreased performance and productivity due to increased illness-related absenteeism and higher compensation costs (Kurniawidjadja, 2020).

According to WHO, in 2020, the diseases causing the highest mortality rates were coronary or ischemic heart disease (~16%, 8.9 million deaths), followed by stroke, chronic obstructive pulmonary disease, and lower respiratory tract infections. Data from the Indonesian Ministry of Health (2020) similarly show that Non-Communicable Diseases (NCDs), such as coronary heart disease, cancer, diabetes mellitus, tuberculosis, and lung disease, are the leading causes of death in Indonesia (Rahmanto, 2021). Hypertension complications significantly contribute to mortality, accounting for at least 45% of heart disease deaths and 51% of stroke deaths. Deaths from cardiovascular diseases, particularly coronary heart disease and stroke, are projected to rise to 23.3 million by 2030 (Kemenkes RI, 2014). Risk factors—including

smoking, hypertension, diabetes mellitus, lifestyle, psychosocial stress, and low consumption of fruits and vegetables—account for over 90% of acute Coronary Heart Disease (CHD) cases among South Asians (Haffner, 1998; Zodpey et al., 2015).

The global prevalence of hypertension is approximately 22%, with Africa experiencing the highest at 27%, and Southeast Asia ranking third at 25% (Kemenkes RI, 2019). In Indonesia, hypertension prevalence is highest in South Kalimantan Province (44.13%), followed by West Java (39.6%), East Kalimantan (39.3%), and Central Java (37.57%) (Kementerian Kesehatan RI, 2018).

Hypertension severity can escalate, causing target organ damage, especially when prevention behaviors are inadequate—such as low treatment awareness, infrequent health checkups, poor knowledge of comorbidities, and low medication adherence (Olisa & Oyelola, 2009). Factors influencing hypertension among workers include job type, work environment, workload, lifestyle, and individual characteristics. Hypertension correlates with physical inactivity and obesity; noisy environments exceeding 85 dB, shift work, and overtime may increase hypertension incidence (Noer & Laksmi, 2014; Permatasari, 2015).

Risky behaviors contribute to hypertension prevalence—for example, 96% of Nigerian university staff report unhealthy diets, 27% low physical activity, 5% excessive alcohol intake, and 2% smoking (Ordinoha, 2013). A healthy workplace involves collaboration between employees and management to continuously improve health, safety, and welfare (Schill & Chosewood, 2013). Workplace health promotion focuses on preventing and minimizing health hazards and improving knowledge to maintain employees' physical, mental, and social well-being (Whitehead, 2006).

The West African Health Organization (WAHO) implements workplace health promotion programs to reduce hypertension by encouraging physical activity, healthy dietary behavior, and weight control among ECOWAS member states (Schröer et al., 2014). In Indonesia, community-based hypertension prevention efforts such as *GERMAS* support management and control programs emphasizing early detection and counseling about NCD risk factors. The *CERDIK* and *OBEY* programs promote hypertension prevention and control (Kemenkes RI, 2023).

Manufacturing Company X in Semarang city produces poultry feed for broilers and layers. Its activities include raw material processing, packaging, and nationwide marketing, operating three shifts over 24 hours. A preliminary health study from Medical Check-Ups (MCU) at Company X revealed Non-Communicable Diseases (NCDs) among workers: hypertension (17%), blood sugar abnormalities (16%), heart and lung irregularities (0.02%), and obesity indicated by a 57% prevalence of elevated BMI.

Interviews with workers showed that 6 out of 10 hypertensive employees experienced rapid fatigue, dizziness, and aches, often taking leave to rest. Nine out of 10 hypertensive workers reported insufficient regular exercise due to lack of leisure time. The company currently lacks workplace hypertension prevention programs such as healthy gymnastics, regular screenings, or health promotion activities. This absence of preventive measures and underutilization of health services negatively influence employees' health attitudes, potentially decreasing health status, increasing workplace accidents, and reducing productivity.

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Company management's role is critical in communicating Occupational Safety and Health (K3) matters via programs and training that actively engage workers, aiming to prevent health problems and workplace accidents.

Given this context, the researcher is interested in studying the "Analysis of the Influence of Hypertension Prevention Programs on the Hypertension Status of Manufacturing Workers in Semarang City."

Hypertension-related problems among employees can be mitigated by enhancing employee awareness of disease prevention and control through workplace support. Interviews with occupational health program coordinators at the animal feed company revealed that preventive occupational health efforts are minimal; current company initiatives focus mainly on curative measures responding to health complaints. Therefore, deeper preventive strategies are needed to improve employee lifestyles and overall health status.

Research objectives include analyzing the impact of hypertension prevention programs on employee awareness and hypertension status within the animal feed company. This study is expected to provide academic insights into health promotion science related to workplace hypertension prevention and control. It aims to inform companies and industries about the importance of occupational health initiatives focused on hypertension prevention behaviors, contribute to improving worker health, and serve as a foundation for further research on effective health promotion interventions.

METHOD

The author examined only the influence of hypertension prevention programs on hypertension awareness and status. There was an effect of the provision of hypertension prevention programs on hypertension status before and after the intervention. This study was a type of quantitative research with a quasi-experimental design using a pre-test post-test control group approach. Two groups of respondents were involved, namely the control and intervention groups, with the intervention group measured before and after treatment, and the control group measured at the same times without treatment. The same questionnaire was administered to each group of respondents twice, with the interval between pre-test and post-test set at 15–30 days to avoid memory bias. The population consisted of all employees of animal feed companies in Semarang, totaling 257 employees. Sampling was conducted to obtain a representative sample size using a predetermined formula, resulting in 30 participants in each group. The variables studied included prevention programs, awareness levels, and hypertension status, with measurements conducted using questionnaires and other instruments. Primary data collection was carried out to obtain direct information from respondents, complemented by secondary data. The research also involved instrument validation and reliability testing, as well as data analysis using systematic processing techniques. The analysis described respondent characteristics and tested the influence of prevention programs on awareness using appropriate statistical tests.

RESULTS AND DISCUSSION

Univariate Analysis

Characteristics of respondents

Table 1. Characteristics of respondents

Characteristics	Mean±SD control; (Min-Max)	Mean±SD interventions; (Min-Max)
Age	40.23±9.853 (22-59)	43.87±7.912 (30-58)
Characteristics	Control f (%)	Intervention f (%)
A history of hypertension in the elderly		
Exist	15(50)	12(40)
No	15(50)	18(60)
Smoking habits		
Active smokers	2(6.7)	8(26.7)
Have you ever smoked	10(33.3)	6(20)
Non-smokers	18(60)	16(53.3)

Based on Table 1, it is shown that the ages in the intervention group have a mean and standard deviation of 43.87 and 7,912, while the minimum and maximum ages are 30 and 58. The age control group had a mean and standard deviation of 40.23 and 9.853, while the minimum and maximum ages were 22 and 59. The intervention group had the largest history of hypertension in the elderly, which was 60%, while the percentage of 26.7% was active smokers.

Data Normality Test

Table 2. Normality Test

Group		Normality
Intervention	Pre test	
	Awareness	0.003b
	Systolic blood pressure	0.001b
	Diastolic blood pressure	0.219a
	Post test	
	Awareness	0.027b
	Systolic blood pressure	0.001b
	Diastolic blood pressure	0.162a
Control	Pre test	
	Systolic blood pressure	0.029b
	Diastolic blood pressure	0.650a
	Post test	
	Systolic blood pressure	0.058a
	Diastolic blood pressure	0.667a

Description: a: Normal or >0.05; b: Abnormal < 0.05

Based on the normality test, the data showed that the intervention group that had a normal data distribution was shown in all data on diastolic blood pressure, both pre test and post test. In the control group that had a normal data distribution, all data on diastolic blood pressure

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both pre and post test and on post-test systolic blood pressure data were shown, while others showed abnormal data distribution.

Bivariate Analysis

The effect of hypertension prevention programs on hypertension status

Table 3. The effect of hypertension prevention programs on hypertension status

Parameter	Control	Intervention
Hypertension	Mean±SD; Median(Min-Max)	Mean±SD; Median(Min-Max)
Systolic blood pressure		
Pre	144.2±18.6; 142.5(120-197)	146.6±21.4; 144.5(120-215)
Post	144.3±17.1; 141.5(120-190)	142.1±18.7; 137(120-200)
<i>P</i>	0.682b**	0.000 b*
Diastolic blood pressure		
Pre	83.53±7; 84(70-97)	83.4±7.5; 82.5(70-97)
Post	83.27±6.9; 83(70-97)	82.3±6.2; 83(70-92)
<i>P</i>	0,103a**	0,012a*

Description:

a: Paired T Test,

b: Wilcoxon Test;

*p<0.005: There is an influence;

**p>0.05: No effect.

Table 4. The results of Wilcoxon's analysis

Hypertension Status	Control f (%)	Intervention f (%)
Pre		
Hypertension	17(56.7)	19 (63.3)
Normal	13(43.3)	11 (36.7)
Post		
Hypertension	17(56.7)	12 (40)
Normal	13(43.3)	18 (60)

The results of Wilcoxon's analysis showed that there was no difference in the mean systolic blood pressure in the control group with a value of p=0.682, while in the intervention group there was a difference in the mean systolic blood pressure after being given a hypertension prevention program intervention with a value of p=0.000. The results of the t-test analysis showed that there was a difference in the average diastolic blood pressure before and after treatment with a value of p=0.012 in the intervention group, while in the control group there was no difference in the average diastolic blood pressure with a value of p=0.103. The hypertension status in the intervention group with the hypertension category decreased from before the intervention by 63.3% to 40%. In the control group, hypertension status had the same frequency, which was 56.7%

Hypertension prevention programs are formed based on lifestyle factors, which basically vary from a person's lifestyle, unhealthy lifestyles can trigger the onset of various diseases such as lung disease and cardiovascular disease (Susilowati, 2016). Hypertension prevention

programs are in the form of hypertension prevention movements with socialization, healthy exercise and routine blood pressure checks.

The results of the influence test explained that there was an effect of the hypertension prevention program on hypertension status as shown in the results of systolic and diastolic blood pressure measurements in workers of manufacturing companies in the city of Semarang in the intervention group. This is because this program is in accordance with the health promotion program strategy to reduce high blood pressure or hypertension carried out by the West African Health Organization (WAHO), which supports several ECOWAS member States in the development of intervention plans and policies to prevent the occurrence of Non-Communicable Diseases (NCDs) in the workplace in the form of efforts to improve workers' physical activity, dietary behavior, and weight control (Schröer et al., 2014).

Hypertension is a global health problem, due to its high frequency and high risk of developing heart and blood vessel diseases. Previous research has shown that providing health education on controlling high blood pressure, and hypertension exercises can reduce blood pressure, with it being shown to increase knowledge, improve attitudes, and reduce blood pressure (Adriani et al., 2021). So, people who do little physical activity will experience an increase in heart rate. This can make the heart load to pump harder, leading to an increase in blood pressure. Additionally, a lack of physical activity can increase the risk of obesity which ultimately results in an increase in blood pressure. Physical activity is important for everyone, whether small, large, old, or young need to do enough physical activity (Sihotang & Elon, 2020).

This study is in line with previous research that explained that systolic and diastolic blood pressure in respondents decreased before and after the administration of ergonomic exercises (Huda & Alvita, 2020). Regular blood pressure checks are necessary, in accordance with previous research which explains that the existence of facilities in the form of regular visits and treatments provided by health services is effective in controlling blood pressure in urban Nepal (Mozu et al., 2023).

When compared to the control group, the results explained that there was no effect on hypertension status on the results of systolic blood pressure measurement in livestock company workers in Semarang. However, there was an effect on the control group on the results of diastolic blood pressure measurements. This conflicting result is due to the fact that some workers in the control group may have better access to their home environment, so they have taken several hypertension prevention measures.

CONCLUSION

The hypertension prevention program had a significant effect on improving hypertension status, including reductions in systolic ($p=0.000$) and diastolic blood pressure ($p=0.012$), among employees of an animal feed company in Semarang. To further support blood pressure management, workers are encouraged to perform gymnastics during work breaks to promote muscle stretching and increase circulation. Regular blood pressure monitoring is also recommended. Industry owners should facilitate this by providing accessible blood pressure monitoring devices, organizing gymnastics programs, and conducting ongoing education about hypertension prevention. Future research could explore the effectiveness of combined interventions to accelerate blood pressure reduction in hypertensive individuals.

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