The Influence of Traffic Noise And Work Stress on The Blood Pressure of Tirtonadi Bus Station Workers

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Abstract. Work noise and stress do not only appear in industrial areas but also in public places like the Bus Station. One of the risk factors at the bus station is noise and work stress. This study aims to determine the relationship between traffic noise and work stress with blood pressure. research methods with observational analytic and cross sectional approaches. The population is 95 Tirtonadi Bus Station field workers. Sampling by simple random sampling and get 50 respondents as samples. The instrument used a Sound Level Meter to measure noise, Job Stress Questionnaire based on from Minister of Manpower regulations No. 5 of 2018 to assess work stress and Spyghmomanometer Aneroids to measure blood pressure. Independent and dependent variables are calculated by the Spearman rank test. Test results show an intermediate p-value traffic noise with blood pressure of 0.813 and 0.715. work stress with systolic and diastolic blood pressure shows p-values of 0.037 and 0.047. Conclusions There is no significant relationship between noise and blood pressure. There is a relationship between work stress and blood pressure.

Keywords: Traffic Noise, Work Stress, Blood Pressure, Bus Station Workers

1. Introduction

Noise in the modern era does not only come from factory machines but also a vehicle. WHO data (2018) states at least 100 million respondent in the European Union the road traffic noise is exposed, and in Western Europe alone at least 1.6 million years of life lost due to road traffic noise. Pressure at work can result in cases of stress at work. In Europe, more than 1.2 million respondent every year there are cases of premature death due stress and depression (The Guardian, 2018).

Work noise and stress not only appear in industrial areas but also in public places such as terminals, stations and airports. Such that described in Law No. 1 of 1970 in article 2

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paragraph 2 (f) that 2 "Workplace is where transportation of goods, animals or humans, both on land, through tunnels, on the surface of water, in water as well in the air".

Research by Van Kempen (2012) and Purwanto (2012) states that one of the effects of work noise and stress is high blood pressure or hypertension. Hypertension itself is a common cause of disorders cardiovascular both in developed and developing countries (Ministry of Health, 2018). Amount hypertension sufferers in the world continues to increase every year. Estimated at in 2025 there will be 1.5 billion respondent in the world affected by hypertension. Meanwhile, in Indonesia itself there has been an increase in the cost of hypertension services BPJS Employment starts from 2014 to 2016 (Ministry of Health, 2018).

Tirtonadi Terminal Surakarta is the largest terminal in Surakarta. Tirtonadi Terminal operates 24 hours because it serves the connecting bus lines both Inter-City-Within-Province and Inter-City-Inter-Province. From the results interviews with local officials, every day in 3 shifts there are ± 1,3003 - 1,500 bus fleets entering the terminal. From the results of the initial survey using Sound Level Meter to measure noise, traffic noise levels at Eastern work point is 90.1 dB and in the western work point is 86 dB. This number including above the Threshold Limit Value at work that is 85 dB. Respondents work in the field from the security unit, the last service unit cross, and janitor. Measurement results using Aneroid sphygmomanometer to measure blood pressure in 12 respondents at the point of cooperation found 58.3% or 7 out of 12 respondents had pressure high blood pressure with an average service life of 21 years. Past service workers traffic and security at Tirtonadi Terminal are given target demands every day to do a ramp check 100 times. Based on the results of the interview, some workers also experience sleep disorders. Initial measurement results using the Job Stress Diagnosis questionnaire taken from Minister of Manpower regulations No. 5 of 2018 concerning Occupational Safety and Health at Work Environment 12 respondents found 8.3% or 1 out of 12 respondents experienced mild stress, as many as 66.6% or 8 out of 12 respondents experienced moderate stress, and 25% or 3 of 12 respondents experienced severe stress.

Based on the above problems, researchers want to conduct research with the title "the influence of Traffic Noise and Stress Work with Pressure Blood on Workers in Tirtonadi Terminal, Surakarta

2. Methods

This research was used analytic observational type that is research explain the differences between variables through testing previously formulated hypothesis. This research approach use a cross sectional approach wherein the cause / risk variable and causal is measured or collected at the same time and carried out at the same time situation (Notoatmodjo, 2012).

The population of workers in Tirtonadi Terminal, Surakarta is 95 respondent. The population after inclusion was 54 respondent. Criteria for Inclusion Workers work in the Tirtonadi Terminal field, Surakarta. Workers with an age range of 20 - 55 years, Workers with a normal Body Mass Index (BMI), Workers do not have a family history of hypertension. Workers do not consume alcohol 1x24 hours before measuring blood pressure.

The sampling method was carried out by probabillity sampling. the minimum sample size after calculation of 48 respondents, but to anticipate the existence of respondents who fall into

the exclusion criteria, the research sample used is 50 respondents. Data analysis used analysis to determine the frequency characteristics of variables and bivariate analysis to determine the correlation between independent and dependent variables.

Our research instruments have used a sound level meter to measure noise, work stress questionnaire based on the regulation of the Minister of Manpower regulations No. 5 of 2018 and Aneroid Sphygmomamometer to measure blood pressure. Univariate analysis includes age, mass index the body which is calculated based on height and weight, work stress, noise and blood pressure. Bivariate analysis uses the Spearman rank correlation test.

3. Results

3.1 Univariat Analysis

Respondents in this study numbered 50 respondent in which the whole is a field worker consisting of cleaning workers, workers security section and traffic control workers. Respondents in this research is male, body mass index (BMI) is normal, no consumed alcohol during the past 24 hours, and has no history hypertension.

3.1.1 Data Characteristics of Respondents

Characteristics of respondents consisted of age, work area and work stress

Table 1. Charaterstics of Respondent

Age	Blood pressure				N
	Nrml	Pre Hyprtn	Hyprtn grade 1	Hyprtn grade 2	
20-25	0	2			2
26-35	3	5	2		10
35-45	1	6	2	1	10
46-55	3	6	16	3	28
Area					
East	3	11	7	4	25
West	4	8	13	0	25

Sources : Prymary Data, 2019

Information

Hyprtn : Hypertension

Nrml : Normal

Table 1 explains the characteristics of the respondents. where for hypertensive patients dominant in the age range 46-55 and for the work area is almost balanced in both areas.

The results of the cross tabulation table show the number of workers in the category low work stress who have normal blood pressure of 3 respondents, workers with prehypertensive as

many as 6 respondents, workers who have level 1 hypertension as many as 5 respondent. Meanwhile, the number of workers in the moderate work stress category who have blood pressure normal amounted to 4 respondents, workers with prehypertensive totaling 12 respondents, workers with hypertension level 1 a total of 15 respondent as well as workers with level 2 hypertension totaling 4 respondents. Meanwhile, the number of workers in the job stress category is high there are only 1 respondents with prehypertensive.

3.2 Bivariate Analysis

The researcher uses the backup correlation test, the Spearman Rank test to find out the relationship between traffic noise and blood pressure workers in Tirtonadi Terminal, Surakarta. The results of the backup correlation test are tests Spearman Rank 'by looking at the p-value significance can be seen in

Table 3. Spearman Rank correlation test results' between Noise with Blood pressure

Variable	P-Value	r
Noise*Sistolik	0,813	0,034
Noise*Diastolik	0,315	0,053

Spearman Rank correlation test results table shows the significance value or p-value between traffic noise and systolic blood pressure and diastolic 0.813 and 0.715, respectively. This value shows the data the absence of a significant correlation between traffic noise and variables blood pressure of workers at Tirtonadi Terminal, Surakarta.

Table 3 shows there is a relationship between work stress with systolic and diastolic blood pressure. r values indicate the direction of a positive correlation where the more stressed a person is, the more risk he will get from blood pressure with the weak correlation power.

Table 4. Spearman Rank correlation test results' between Work Stress with Blood pressure

Variable	P-Value	r
Work Stress*Sistolik	0,037	0,296
Work Stress*Diastolik	0,047	0,198

Sources : Primary Data, 2019

4. DISCUSSION

Age of respondents included in this study were workers the Tirtonadi Terminal's cleaning, security and traffic control department, Surakarta with an age range of 20 to 55 years. This age selection has been

in line with the theory put forward by Gray, et al (2005) which explained that as many as 50% of men and women over the age of 55 years old suffering from isolated systolic hypertension, 160 systolic blood pressure mmHg and diastolic 90 mmHg. Purwanto (2012) also supports with his theory which explains that the higher a person's age is the higher the blood pressure.

This is due to the elasticity of the wall blood vessels decrease with age. In the results of cross tabulation between age and blood pressure known in the final adolescence category overall

respondents only suffer from prehypertension. Meanwhile, hypertension sufferers are often found in the age category of late adulthood and early adulthood is as much 24 respondent. This shows that the older the respondent's age, the higher also his blood pressure.

Andria (2013) also explained that the incidence of hypertension increases with age. This matter due to the increasing age of a person the body will has decreased in physiological terms such as the reduction in the body the flexibility of blood vessels and the appearance of crust on the edges of blood vessels which can cause the narrowing of blood vessels to the end increase blood pressure.

The noise source at Tirtonadi Terminal, Surakarta comes from the engines and horns of buses that are active inside the terminal, whistle traffic service and human activity unit officers in the terminal area. Noise measurements at two different points namely the eastern terminal and the western terminal. Measurement results in the east area obtained 77 dB (A). Meanwhile, the measurement results in the western area are also 77 dB (A). for the mean value between east and west noise respectively 80.5 dB and 78 dB. This shows the noise value in the east area is greater than in the west area.

This is in accordance with the situation in the field where the activity in the eastern terminal is denser than the western terminal at the time of measurement. However, the type of noise at the Tirtonadi Terminal is included intermittent noise or intermittent where the value of the intensity of noise is fluctuating or changing for a certain time. According to Ardiansyah (2013), if the type of noise in a workplace is fluctuating, the noise measurement results seen are equivalent noise values (Leq). Equivalent value is a certain value of noise from changing noise which is equivalent to a fixed noise level at the same time interval. On that basis, the noise value between the eastern terminal and the western terminal is the same, 77 dB (A). This value exceeds the Noise Level Quality Standards for the trade and service area of 70 dB (A) based on the Decree of the Minister of Environment No. 48 of 1996. Although not directly, according to Muhtadi (2011) environments with high noise can cause cardiovascular disorders such as vasoconstriction and hypertension.

The results of cross tabulation between noise variables in the east area showed that workers suffering from hypertension, both level 1 and 2 hypertension, were 11 people. Meanwhile, in the western area workers who experience hypertension, both level 1 and 2 hypertension, as many as 13 people. Workers in the western terminal suffer more hypertension than workers in the eastern terminal. In fact, in plain view the eastern terminal has a denser activity compared to the western terminal. This result occurs because workers with an early age category in the area more west than workers in the east.

According to interviews, the peak activity at the Tirtonadi Terminal took place on weekends. However, researchers in this study have limitations, one of which is that it is a requirement from the terminal that data retrieval is only allowed during Monday - Friday workdays. The researcher collected the noise data on Tuesday where the terminal activity was not busy enough. This could be the cause of the absence of variations in noise values in this study. It is better if the next researcher wants to do a noise measurement, it is better to choose days with heavy bus activity such as days before holidays such as religious holidays or before long holidays which do not have to be on weekends.

Hawari (2008) states that noise is considered as a stressor by the body captured sense of hearing. Noise exposure activates sympathetic nervous system and induces hormonal changes in the body played by the hypothalamic-pituitary-adrenal (HPA) axis. Mukhlish, (2018) states the sympathetic nervous system which activates the hypothalamus causes the production of epinephrine and norepinephrine hormones by the medulla the adrenals get taller. This high hormone level is able to increase blood pressure. This relationship is also supported by research conducted by Suryani (2018) in the residential area of Jalan Ambengan Surabaya shows that at high noise intensities > 55 dB (A) yang had high blood pressure of 24 people 72.7%. Whereas for areas with low noise intensity [<55 dB (A) which have pressure high blood pressure by 5 people (25.0%). Relationship test results using Chi square analysis results obtained p-value = 0.002 where p-value <0.005 then noise is related to blood pressure.

Stress affects high blood pressure through the sympathetic nerves. Stress resulting in sympathetic nerves stimulating juxtaglomerular cell apparatus increase renin production. Renin production will activate the RAA system (Renin-Angiotensin-Aldosterone) so that it will increase Angiotensin II.

Increasing the amount of Angiotensin II will result vasoconstriction in the vascular smooth muscle that results in increased blood pressure (Purwanto, 2012). The theory is also supported by research Ardian (2018) at Bangetayu Semarang Health Center who presented the results that of the 99 respondents found that 46 respondents experienced stress moderate level and 45 respondents experienced high stress levels. Test results Statistical relationship between stress levels and blood pressure in hypertensive patients at Puskesmas Bangetayu Semarang using Somer's test produced a p value of 0.001 or p-value <0.005 which means there is a relationship between levels

stress with blood pressure in hypertensive patients. The results of statistical analysis with the Spearman rank correlation test 'on this research shows p-value = 0.037 and p-value = 0.047 which means there is a relationship between work stress and blood pressure in workers at Tirtonadi Terminal, Surakarta. In addition to the p-value, in a statistical test this research also known correlation coefficient value or r positive that is r = + 0.296 and r = + 0.198 which means the relationship between work stress variables with stress blood goes in the same direction. Correlation coefficient or r is positive in the test results Spearman Rank correlation shows that the higher the stress level experienced by workers, the blood pressure of workers will also increase. The amount Correlation coefficient values refer to Table 4 interpretation of the Pearson Spearman Rank test 'by Dahlan (2011) showing the strength of the relationship between Work stress variable with blood pressure variable is very weak.

A weak relationship between work stress and blood pressure can occur bearing in mind there are age factors that are associated with more blood pressure dominant considering that most respondents came from the adult age category late and early elderly. In addition, there are other factors that could be more dominant in influencing blood pressure that is not a researcher control such as smoking, exercise habits, and nutritional intake. The relationship between stress and blood pressure of workers in the Terminal Tirtonadi, Surakarta in accordance with research conducted by Andria (2013) to the elderly at a Posyandu in the city of Surabaya who explained that the less a person's immunity to stress the higher the possibility of a person suffering from hypertension.

5. Conclusions

Traffic is a risk factor for blood pressure. in research based on statistical tests there is no agreement between traffic with detecting cross tabulations it shows the opposite. for work pressure. suggestions for the terminal tirtonadi to make a routine exercise program as an effort to reduce work stress.

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