

The Relationship of Noise and Blood Pressure toward Labor in Ground Handling Section of Sultan Hasanuddin Airport Makassar

Merry Sunaryo¹, Zhafira Sakinah², AfwinaLuthfanny F³,
Muflihun Abduh⁴, Abdul Rohim Tualeka⁵

^{1,2,3,4,5}(Department of Occupational Health and Safety, Airlangga University, Surabaya, Indonesia)

Abstract:-noise can be a physical dangerous work environment factor that influence heart and cause physiological reactions such as changes in blood pressure (± 10 mmHg). Noise of the aircraft engine become a risk factor for the ground handling labor in charge when the aircraft in on the ground. This study aimed to determine the relationship of noise, age, duration of work and the use of protective equipment Ear (APT) with blood pressure of Ground handling labor of Sultan Hasanuddin Airport in Makassar. This research is analytic survey with cross sectional study toward 54 labors of ground handling. The analysis between variable using chi square test and analysis of blood pressure are different before and after working by using paired t test.

The result of study shows: there is a difference of systolic and diastolic blood pressure before and after working. There is relationship between noise intensity, duration of work, and the use of APT before and after working whereas there is no relationship between age and blood pressure. Hence, it is necessary to check blood pressure periodically, review duration of working to the standard of 8 hours per day, giving APT to the labor and to supervise its use and implementation of education and training to the labor regarding noise.

Keywords:- Noise, Blood Pressure, Ground handling labor

I. INTRODUCTION

Noise is one of the factors that are common occur in the workplace. Along with industrialization process is accompanied by technology advance and developing economy growth therefore risk treat of disturbance cause of noise will also increase.

Progress in the field of air transportation technology has rapidly developed because of the growing of transportation need by society. The impact of these advance is noisy comes from aircraft noise that can disturb the health of labor or society are exposed directly.

Generally, high-pitched noise is very annoying especially to the discontinuous or the arrival of a sudden and unexpected which can cause physiological reactions such as changes in blood pressure (± 10 mmHg), increased pulse rate, basal metabolism, sleep disorders, and etc.¹⁰

Hearing process involves heart construction, blood circulation, improve the work of heart, If exposed to high-power sound like the sound of aircraft taking off or workplace is very crowded. So, blood pressure increased by 30%. Negative effect increases with the fact of blood pressure is increase in high level moreover when the noise finished.

Sultan Hasanudin airport is the international airport with a very solid schedule daily. The noise generated by aircraft is one of the main problems of health and working safety. Noise not only threatens employment in the aircraft or existing workers around the aircraft, but also the people living around the airport. Labors are exposed directly by noise is ground handling labor and is divided into various units such as part cargo, aviation security, aircraft technicians, and others.

Despite the fact that the aerospace crew remain exposed to high intensity noise but the ground crew and personnel control remains the hardest hit because of noisy sound pressure level (intensity), duration (time), or both of them²

It encourages the need for research on the relationship between noise with blood pressure before and after working on labor of Sultan Hasanuddin Airport in Makassar, especially on the ground handling section.

II. MATERIALS AND METHODS

This research was conducted in ground handling Sultan Hasanuddin Airport in Makassar. The choice of location is based on the results of preliminary observations known that the intensity of the noise generated by aircraft engines is quite high. This type of research is analytic survey research with cross sectional study approach. The population in this study is all part of the ground handling labors of Sultan Hasanuddin Airport in Makassar as many as 121 people from four units, GSE, and the loader ramp, cargo, and aviation security.

The sample total was determined by using slovin formula then samples of each unit is determined by proportional random sampling to obtain 54 samples. Sampling was done by randomly selecting from a list of labor.

Primary Data regarding age, duration of work, and the uses of ear protection is obtained from direct interviews on labor by using a questionnaire. Data about the noise intensity obtained based on the measurement of Noise Dose Meter merk Quest and data on blood pressure obtained by blood pressure measurements with labor before and after work by using a sphygmomanometer merk Omron.

Data processing was performed by using SPSS version 16 computer program. Data presentation conducted in the frequency distribution table, percentages and cross tabulation between dependent and independent variables. Relationships between variables were tested using the chi square test; the difference in blood pressure before and after the working was tested by using two of samples paired t test (paired sample t test).

III. RESULT

The results of the study are described as follows:

A. Univariate analysis

1. Labor Characteristic

Characteristics of labor in this study consisted of age, education level, and work unit and work duration. From 54 labors, the largest percentage by age group are in the age of 50-54 totally 11 people (20.4%) whereas the smallest percentage in the age of 19 as 1 person (1.9%). The largest percentage according to education level is senior high school graduation or equivalent is 49 labors (90.7 %) and the smallest is senior high school or equivalent is 0 people (0%) whereas based on working unit. The biggest percentage of the ramp work unit and loader with total 27 people (50%) and the smallest from cargo unit with 29 people (53.7%) whereas the new working period (<5 years) of 25 persons (46.3%).

2. Distribution of respondents by variable

a) Intensity Noise

Total of 35 labors (64.8%) are exposed to noise that does not qualify (> 85 dB) and there are 19 labors (35.2%) were exposed to noise intensity qualify.

b) Age

young age of labor (<40 years) as many as 31 labors (57.4%) and old age (\geq 40 years) as many as 23 labors (42.6%).

c) work duration

Total of 33 labors (61.1%) with ineligible work duration and 21 labors (38.9%) with a length of work to qualify.

d) The use of APT (Ear Protective Equipment)

Labor who does not use ear protection equipment amounted to 44 people (81.5%) who use ear protection equipment that is 10 people (18.5%).

e) Blood Pressure

Labor with blood pressure increased amounted to 31 people (57.4%) and whose blood pressure is not increased amounted to 23 people (42.6%).

B. Bivariate analysis

1. Differences in Blood Pressure before and After Working.

Results of statistical analysis with paired t test (paired-samples t test) obtained p value = 0.000 systolic (p <0.05) and diastolic p value = 0.000 (P <0.05). This means that there are differences in systolic and diastolic blood pressure before and after working.

2. Relationship with Blood Pressure and Noise Intensity

From 35 labors that are exposed to loud ineligible noisy intensity (> 85 dB), as many as 30 people (85.7%), increased blood pressure and as many as 5 people (14.3%) did not increase blood pressure. While the 19 labors who are exposed noise with eligible intensity noise, as many as one person (5.3%), increased blood pressure and as many as 18 people (94.7%) whose blood pressure is not increased. The results of chi-square test with continuity correction using the obtained p value = 0.000 (p <0.05). Thus H_0 is rejected means there is a relationship between the intensity of noise with blood pressure.

3. The relationship of blood pressure and age

From 23 labors that belong to the category of old age (\geq 40 years), as many as 14 people (60.9%), increased blood pressure and as many as 9 people (39.1%) blood pressure did not increase. While the 31 labors who belong to the category of young age (<40 years), as many as 17 people (54.8%) which increases blood pressure and 14 people (45.2%) who blood pressure did not increase. The results of chi-square test with

continuity correction using the obtained p value = 0.783 ($p < 0.05$). Thus H_0 accepted meaning there is no relationship between age and blood pressure.

4. The relationship of work duration with Blood Pressure

From 33 labors with work duration does not qualify, as many as 26 people (78.8%) blood pressure increased and as many as 7 people (21.2%) blood pressure did not increase. While 21 labors with qualify working duration, as many as 5 people (23.8%) which increased blood pressure and 16 people (76.2%) which blood pressure did not increase. The results of chi-square test with continuity correction using the obtained p value = 0.000 ($p < 0.05$). Thus H_0 is rejected. It means that there is a relationship between work duration with blood pressure.

5. The Relationship of APT using and Blood Pressure

From 44 labors that do not use ear protective devices, as many as 29 people (65.9%), which blood pressure increased and as many as 15 people (34.1%) which blood pressure did not increase. While the 10 labors that are using ear protective devices, as many as 2 people (20%) which blood pressure increased and 8 (80%) which blood pressure did not increase. The results of chi-square test using Fisher's exact p value = 0.012 obtained is smaller than $\alpha = 0.05$. Thus H_0 is rejected. This means that there is a relationship between the uses of ear protective equipment to the blood pressure.

IV. DISCUSSION

1. Blood Pressure

Based on bloodpressure frequency table is known that workers whose blood increase with totaling 31 labors(57.4%)andthosewhose blood pressure is not increased that amount to 23 labors (42.6%). and Results of statistical analysis with paired t test (paired sample t test) obtained p value = 0.000 systolic ($p < 0.05$) and diastolic p value = 0.000 ($p < 0.05$). this is means that there is a difference of systolic and diastolic blood pressure before and after working.

Increased of blood pressure on labor influenced by a lot of factors, one of them is due to exposure to noise during working time. Noise can be affected by the health of body function that can cause increased on body sensitivity like increased of cardiovascular system in the form of increased blood pressure and increased heart rate.

The result of study are consistent with research conducted by EnyHastuti (2005) on labor Ahmad Yani Airport Semarang which also found that there were difference in blood pressure before and after working with average increased of systolic blood pressure with 2.2 mmHg and systolic blood pressure with 0.87 mmHg.⁶

The rise in blood pressure usually goes together between systolic to diastolic. The setting of blood pressure control depends on two main determinants namely cardiac output and total peripheral resistance. Cardiac output controls a lot depends on the settings of heart rate and stroke volume. The increasing of heart rate will influence directly to the systolic blood pressure whereas diastolic blood pressure more influenced by the peripheral resistance total.

Noise that occurs will cause the response of the hormonal system and nervous system that will raise the heart rate. So that, it will be given direct impact to the systolic blood pressure, but it takes time to affect the diastolic blood pressure. Changes in blood pressure that occurs will be detected by the auto regulation system will attempt to restore blood pressure to be normal. This causes of the increase in diastolic blood pressure less than the increase in systolic blood pressure.

2. Intensity Noise

Noise becomes one unintended consequence of technological progress in this regard in the field of air transport. Noise is a factor that affects not only the person with hearing loss (auditoir) problem but also non auditoir disorders.

Noisy in the ground handling of Sultan Hasanuddin Airport Makassar caused by the sound of aircraft engines which landed (landing) and the aircraft take off, aircraft take off preparation process, vehicles machine or equipment used to support the handling of the aircraft while on the ground (on land).

Results of cross tabulation between the noisy intensity and blood pressure obtained that not qualify labor who are exposed to noise as many as 30 people (85.7%) increased of their blood pressure and qualify labor who are exposed only 1 (5.3%) increased blood pressure. Chi-square test results showed a correlation between the intensity of noise with blood pressure.

From the results of noise measurements carried out on part of the ground handling labors of Sultan Hasanuddin Airport Makassar obtained an average noise in the range of 82-95 dB which indicates that exposure to noise of the laborer has exceeded the threshold value that has been set.

Noise can affect other parts of the body including the heart. In general, high-pitched noise, very disturbing even more disjointed or the arrival of a sudden and unexpected can cause physiological reactions such as increased blood pressure, increased pulse rate, basal metabolism, and others¹⁰.

Noise can be responded by the brain that perceives this as a threat or stress then associated with stress hormones. Stress will be affected. The nervous system which then affects the heart rate will result in changes in

blood pressure. Repetitive stress can make changes to the blood settled. The increase in blood pressure were continuously will result in hypertension and others disease.⁴

3. Age

Old Age is the process of gradual disappearance of the network's ability to repair itself, replacing and maintaining the normal structure and function.¹¹ chi square statistical test results showing there is no relationship between age and blood pressure.

Both systolic blood pressure and diastolic blood pressure increased as the increasing of age. The combination of these changes are very likely reflect a stiffening of blood vessels and decrease spasticity arteri.⁸ the result of this study are consistent with research conducted by EniHastuty (2005) on labor of Ahmad Yani Airport which found no correlation between age and blood pressure.

Increasing of age led to the flexibility or elasticity of blood vessels diminishing physiologically. When the heart rate increases due to the nervous system is stimulated by noise, it is less able to widen blood vessels due to its elasticity, so that the increase in blood pressure will be high. Systolic blood pressure will continue to rise slowly with age, and will rise sharply after the age of 40 years, whereas diastolic blood pressure would increase slowly until the age of 60 years has tended to decline after⁹.

Results of cross tabulation between age and blood pressure is well known that older age categories and younger age category had the same percentage increase in blood pressure is high at 60.9% for old age and 54.8% for young age.

It is probably due to the influence of labor both young and old are constantly exposed to noise in the intensity is high enough, so keep an increase in blood pressure. Another factor that may influence these conditions is factors not examined by the researchers yet, but also can affect blood pressure rising as smoking behavior.

Based on observations during the study, smoking behavior among labors is high enough where the majority of the labors are active smokers. Smoking behavior is one cause of increased blood pressure, moreover, many labors who smoked before measuring blood pressure.

Smoking lead to increased heart rate and blood pressure directly for a while, due to the effects of nicotine in the blood circulation.⁹

4. Working duration

The longer labors exposed to high noise then labor will easily increase blood pressure. Continuously noise will result in the rise of hormones stress which cause increased heart rate so that the higher rise in blood pressure.

Results of cross tabulation between working duration with blood pressure found that 26 labors (78.8%) with ineligible working duration increased the blood pressure by 5 respondents (23.8%) with qualify working duration (≤ 8 hours / day) which increase of blood pressure. Chi-square test results showed no correlation between the working duration and blood pressure. The results are consistent with research conducted HastutiEny (2005) on labor of Ahmad Yani Airport Semarang which found a significant relationship between the work duration with increased blood pressure⁶

For 8 hours or 12 hours of work, employment in ground handling continuous exposure to noise though in different intensities. While the level of intensity noise received by labors due to labor position of the noise source. Exposure to high noise if labor will have to deal with aircraft noise exposure will be lower and labor when resting because it is far enough away from the noise source.

Continuous noise will also resulted in the increase in stress hormones continuously so that the concentration of hormones even higher. The higher of the concentration of stress hormones as faster the heart rate that will result in the higher blood pressure rise. With the nature of the adaptation of the body, the higher the blood pressure rise will be more difficult to return to the original normal blood pressure resulting risk of hypertension will be high.⁵

Noise exposure created stimulation and increase sympathetic nerve activity. If the stimulus is temporary, the reaction will quickly recover in a few minutes. But when it is longer and repeated, exposure can cause physiological changes of neurosensory organs and blood circulatory system.³

5. The use of APT

There is a relationship between the uses of protective equipment ear with blood pressure. These results are consistent with research conducted by Hidayat (2005) which states that there is a significant relationship between the uses of APT with blood pressure. It could be argued that the use of APT shown to have a beneficial effect on blood pressure.⁷ ear protectors available on the ground handling is ear protective devices such as ear plugs and ear muff. From interviews with a questionnaire known that as many as 44 labors claimed not to use ear protection when working. Found that A lot of labors who do not use ear protectors because labor was

disturbed when they have to communicate in working with aircraft handling. In addition there are also labor's ears protective equipment is damaged or missing.

Ear plug function is to reduce the intensity of the noise up to 25 dB. This means that the uses of ear protectors on labor during the work able to reduce the risk of labor due to disturbance causes of noisy of using ear protection equipment using like ear plug that are able to reduce exposure to noise received by labors so that it does not exceed the threshold value that has been set. The using of APT will reduce the received length of noise, it is expected that the effects will be reduced as well.

V. CONCLUSION

Based on the resultsof the discussion canbe obtainedasfollows:

- 5.1 There is a relationship between noise intensity and blood pressure.
- 5.2 There is no relationship between age and blood pressure
- 5.3 There is a relationship of work duration and blood pressure.
- 5.4 There is a relationship of APT using and blood pressure.
- 5.5 There is a difference of blood pressure before and after working.

VI. SUGGESTION

There were suggestions that can recommend to the company, readers, andrespondents on this study as follows:

- 6.1 The examination of blood pressure should be performed periodically on labors.
- 6.2 To the company to review working duration a long day in accordance with safety standards is 8 hours per day.
- 6.3 Provide and provision the ear protective equipment with the standard.
- 6.4 Need to conduct education and training on the effects of noise for labors as well as to increase awareness in using ear protection.

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