

Increase the Threshold of Hearing on Offshore Workers of PT. X in Pabelokan Area

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Abstract

In general the increase auditory threshold frequency audiometric screening starts at 4000 Hz and then expanded in the surrounding frequencies used for conversation. The threshold of hearing is the lowest sound that can still be heard. The higher the value of the threshold of hearing, then power is heard increasingly declining. The effects of noise on hearing loss initially temporary and recovery occurs quickly after exposed by noise. A person exposed to noise is constantly losing power hear who settled and cannot be recovered. Inspection results that PT X workers audiometric in June 2001 until June 2002 showed 148 from 960 workers still experience decreased hearing and 70 people which shows the characteristics of NIHL. This study aims to analyze the factors associated with the increase in the threshold of hearing the offshore workers of PT. X in Pabelokan Island, Kepulauan Seribu, Jakarta. This research is quantitative research with cross sectional design research and carried out from October to December 2014. The results showed that all the variables examined have a relationship with the increase in the threshold of hearing of workers (aged, $r = 0.001$; body mass index, $r = 0.000$; metabolic disease history, $r = 0.000$; working period, $r = 0.000$; smoking habit, $r = 0,022$).

Keywords: audiometric, workers, offshore, Pabelokan

1. Introduction

Noise in the work environment is the main problem in occupational health in different countries. The effect of exposure to noise is higher in developing countries (Nasri, 2005). The prevalence of hearing loss due to noise from year to year is likely to rise. In Thailand, an increase in the prevalence of hearing loss due to noise from 28.1% in 1988 to 35.2% in 2001 (Viraporn, 2008). The World Health Organization (WHO) reports that hearing loss due to noise work is the second largest occupational accidents suffered a lifetime (Tantana, 2014).

Noise results in a non-impact auditory (not against the influence of hearing) and the influence of auditory (influence of hearing) that can last a while or settle. Temporary Deafness (Temporary Threshold Shift-TTS) is a short term effect due to noise that increases the threshold of hearing. Generally it takes about 48 hours each week to recover the threshold of hearing back as before. If the exposure takes place every day, will result in deafness that is settled (Permanent Threshold Shift-PTS).

Early symptoms of the onset of the early PTS without complaint, but if it spreads to the lower frequencies (2000 Hz and 3000 Hz) complaints will arise. Hearing loss at 4000 Hz frequency will continue to grow and settle down after 10 years and then its development became slower. Causes of hearing loss in a person not only because of the exposure to noise is received, there are many other factors that cause hearing loss, such as hypertension, diabetes, drugs, and exposure to the two substances that can damage the ear is the cause of reduced hearing (Buchari, 2007).

PT. X is a foreign multinational corporation that engaged in upstream oil and gas industry in Indonesia with PERTAMINA for the results system. Noise values that exist in the offshore area, PT. X (Pabelokan Island area) ranges from 70-103 dB. In the Pabelokan area there are three departments, namely South Business Unit, Logistics and Power and Gas Facilities.

Results of measurements of the intensity noise by 2013 shows that The Power, Gas and Facilities have very high noise levels, IE 80-100 dB. Logistic Department Office is located adjacent to the Gas Plant Area so that the condition of noise on this area are quite high, which ranged from 76-86 dB (A). Office of the Department of the South Business Unit has the lowest noise level, which ranges from 52 to 70 dB (A). Inspection results that PT workers in audiometric X in June 2001 until June 2002 showed 148 from 960 workers still experience decreased hearing and 70 people which shows the characteristics of NIHL.

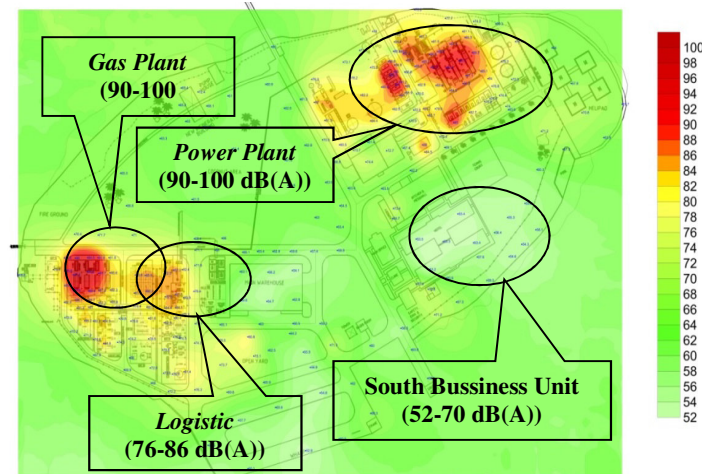


Figure 1. Noise map of Pabelokan Area

Installation of the shield for each machine have not done thus causing workers who work in the area of high noise exposure getting even wear earplug. At the time of the production process takes place, there is only one machine that is enabled, but nearly all the machines in the area so the noise levels caused very high, exceeding 100 dB.

Outline of the problems derived from the background is what are the factors associated with the increase in the threshold of hearing an offshore worker? In General, this research aims to identify and analyzed factors associated with the increase in the threshold of hearing workers offshore. This research specifically aims to analyze the relationship of age, body mass index, metabolic disease, the history of work and increase the threshold to the smoking habit of hearing on offshore workers.

2. Method

This research was conducted on the offshore area PT. X precisely on Pabelokan Island, Kepulauan Seribu, Jakarta. This research is observational research is descriptive-analytic with cross sectional architecture to analyze the factors associated with the increase in the threshold of hearing on offshore workers.

The population in this study are all the employees still working on active status areas with Pabelokan (on duty) totaling 300 men. The number of samples was determined with the formula of stratified sampling so as to get the number of samples of 118 people, with details of the Department's workers Power and Gas Facilities (PGF) 48, Department workers South Business Unit (SBU) as many as 45 people and Logistic Department workers as many as 25 people. The analysis of the data used is correlation analysis using Chi Square test with Contingency Coefficient for each variable-free relationship of variables are bound.

3. Result

Correlation of test results showing that age ($r = 0.001$), body mass index ($r = 0.000$), a history of metabolic disease ($r = 0.000$), the workplace ($r = 0.000$) and smoking habit ($r = 0,022$) has a relationship with the increase in the threshold of hearing on offshore workers. This is evidenced by the value of the variable is the entire significance < 0.05 .

Table 1. Correlation of test results with Independent Variables Increase the threshold of Hearing on Offshore Workers

Independent Variables		Dependent Variable: Increase The Threshold Of Hearing On Offshore Workers						r	OR
		Increase		Normal		Total			
		n	%	n	%	n	%		
Age	> 40 years old	46	88,46	6	11,54	52	100,00	0,001	4,983
	≤ 40 years old	40	60,61	26	39,39	66	100,00		
Body Mass Index	Obese	52	59,09	36	40,91	88	100,00	0,000	-
	Normal	0	0,00	30	100,00	30	100,00		
Metabolic Disease History	Yes	40	67,80	19	32,20	59	100,00	0,000	8,246
	No	12	20,34	47	79,66	59	100,00		
Working Period	> 10 years	46	56,10	36	43,90	82	100,00	0,000	6,389
	≤ 10 years	6	16,67	30	83,33	36	100,00		
Smoking Habit	Yes	34	54,84	28	45,16	62	100,00	0,022	2,563
	No	18	32,14	38	67,86	56	100,00		

4. Discussion

4.1 Age

With age, a portion of the hair cells in the inner ear is going to die because of the "old". Research conducted by Gloria Nixon in 1962 and found that when the age above 40 years of age, a person's hearing threshold will decrease by as much as 0.5 dB every year (Sharif, 2003). It causes human beings to become deaf.

Deafness someone affected by the duration of exposure to noise is received while she was still young (Irwandi, 2008). The number of dead hair cells will cause the loss of power is heard. The hair cells are first to die is that function as receptors high pitch that is the hair cells in the organ of corti. In anatomy, the hair cells in the organ of corti of fewer have a more rounded shape and rough. This is causing the increase in the threshold of the first hearing will take place at a frequency region 4000-6000 Hz (Smith, 2002).

4.2 Body Mass Index

Digestion of carbohydrate produces glucose. Some of the glucose is stored as glycogen and some brought to the brain and other cells. The cell undergoes Glycolysis glucose (glucose is broken down into pyruvate and acetyl Co-a (Ko-enzyme A) to produce energy). Acetyl Co-a enters the cycle Tri Carboxylic Acid and the electron transport chain to produce energy. Glucose into pyruvate via glycerol can be converted into acetyl Co-a and through into fatty acids. Excess carbohydrates can be converted into fat or lipogenesis (Almatsier, 2002).

Excess energy occurs when energy consumption through food exceeds the energy expended. Excess energy will be converted into body fat. Hoarding energy in the body is converted into body fat. Obesity can lead to disturbances in the functioning of a body which is the risk of suffering from chronic diseases such as: diabetes mellitus, hypertension, coronary heart disease, cancer and can shorten life expectancy (Almatsier, 2002).

4.3 Metabolic Disease History

Distribution of metabolic disease experienced by the respondents is as many as 29 people respondents experiencing high cholesterol disease, 14 persons the respondents suffered a disease of high blood pressure (hypertension), 6 the respondents having heart disease (cardiovascular), 6 the respondent suffered an ear infection in disease and as many as four of the respondents having diabetes.

Hypertension is a risk factor that has a strong relationship with the onset sensory-neural hearing loss, (Waskito, 2006). In people with high blood disease, cells of the blood vessels around the ears will be stiffened and hardened. The longstanding hypertension can increase the load resistance resulting in vascular endothelial cells of blood vessel dysfunction. The pathogenesis of circular system can occur in blood vessels in the ear organ accompanied by increased blood viscosity, decreased capillary blood flow and oxygen transport. The lack of oxygen in the blood vessel causing damage to cells in the auditory easy to die so that the signal transmission processes occur which can cause impaired communication (Erna, 2005).

High cholesterol can lead to thickening and loss of elasticity of artery narrowing the lumen occurs which resulted, called mikroangiopati. As a result of cochlear organ will occur mikroangiopati atrophy and decreased hair cells that can give rise to loss of hearing. The statement reinforced with research that reported that Fernanda 71% of people with high cholesterol who are further decline of hearing compared to sufferers do not have high cholesterol (Tobian, 1991).

4.4 Working Period

In this study, the increase in the threshold of hearing most widely experienced by respondents with working period > 10 years and most of the South Business Unit. This is in accordance with the research Hardjanto, et al. (1997) which mentions that in a period of 5-10 years after hearing organ damage extends to the frequencies of 500, 1000 and 2000Hz (frequency encountered in everyday conversation), new sufferers will feel any power loss of hearing. But in that time period, the nature of damage to their hearing has irreversible.

Mechanisms of damage due to exposure to noisy hearing organs take place gradually within the next few years. About 3-5 years of working period, after exposure to noisy 85-90 dB continuously for approximately 8 hours per day will cause damage to the organ of hearing, especially at frequencies of around 4000 Hz.

Noise trauma occurs when a person is in a noisy loud (85-90 dBA) within a period of 8 hours continuously for 3-10 years on a medium frequency (1000-3000 Hz) and high frequency (4000-8000 Hz). This is confirmed by the statement the Rambe (2003) says that the high intensity noise in quite a long time, about 10-15 years, will lead to the occurrence of the damage to the hair cells of the organ of corti (began tearing up the total destruction occurs) resulting in a permanent loss of hearing, (Pratama, 2010).

4.5 Smoking Habit

Cigarettes contain nicotine and carbon monoxide, which has the effect of ischemia. As a result of supply disruptions occur ischemia oxygen to organs so corti hearing loss. Other effects could occur spasm blood vessels, blood viscosity, and arteriosclerotic. Research Cruickshanks (1998) States that there exists a relationship between hearing loss and smoking habit at a ripe old age. The habit of smoking at risk amounted to 1.69 times compared to non-smokers. A male smoker with no history of exposure to noise on hearing loss has decreased the frequency of 4000 Hz in comparison not a smoker (Syarif, 2003).

5. Conclusion

Based on the results of the research on factors associated with the increase in the threshold of hearing of offshore workers, then it can be inferred that the age, body mass index, metabolic disease, a history of the work and the habit of smoking is associated with increase in the threshold of hearing on offshore workers.

Based on the obtained conclusions, advice that can be given to the company and the respondents are as follows:

1. Installation of silencer on a machine that has high noise or more than 85 dB.
2. Do a frequency analysis of noise work environment so that the ear protectors tools procurement can be adjusted to the frequency of the noise and ear Anatomy workers.
3. Create a hearing conservation program to eliminate risk and prevent the growing severity of hearing loss due to noise that will be experienced by employees who work in the offshore area.

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