Increase Noise Hazard on Incident of Occupational Diseases in Agroindustrial Area

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Abstract

Background: The sound generated by a tractor engine is one of the causes of ear disorders. This is usually experienced by people who live in agro-industrial areas, especially those who work as farm laborers, especially when planting and harvesting. Most people spend their free time in the fields, so they indirectly listen to the sound produced by the tool.

Purpose: The literature review study aims to discover the increase of noise hazards on incidents of occupational diseases in agro-industrial areas.

Methods: The method used in the preparation of this Literature Review was obtained from 3 database sources, namely Google Scholar, ScienceDirect, and Pubmed, which was published from 2018 to 2021 using Indonesian keywords, namely "Noise" OR "Agro-industry" OR "Hearing Impaired" OR "Occupational Health Risks". After searching for journal articles using the Google Scholar search engine, according to the keywords that have been determined. Literature analysis took ten journal articles published in 2018-2023, 5 articles discussing noise, two articles discussing hearing loss, two articles discussing occupational health risks, and 1 article discussing agro-industry.

Results: From this study, it can be concluded that the presence of noise intensity that has exceeded the threshold value (85 dB) can increase the risk of increased blood pressure of workers, leading to workplace hypertension. In addition, noise can also cause stress because it is one type of stressor in the workplace.

Conclusion: It is crucial to plan various ear plug measures to reduce noise exposure in the workplace. The nurse's suggestion is to build public awareness regarding the importance of protecting the ears from noise, one of which is using ear plugs. The purpose of the earplug is to protect and reduce the level of noise that enters the ear.

Keywords: Agronursing, Noise, Occupational diseases

Introduction

Agronursing is a holistic and comprehensive client-focused management of nursing care and nursing services in the agricultural area (agriculture, fishery, animal

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husbandry, plantation, and agro-industry)[1]. Diseases that can attack farmers come from the environmental sector (UV rays, chemicals, the sound of agricultural machinery), the psychological sector, work safety, infectious agents, and dangerous animals (snakes, wild animals). Agronursing has a crucial role in overcoming health problems and maintaining the health of farmers[2].

Noise is a form of unwanted sound or sound forms that don't fit the place and the time. The sound is not desired because it interferes with the speech and ears of humans, which can damage hearing or human comfort[3]. While, noise, according to (WHO 2001), is to the human hearing system in the form of reduced one's hearing power and even loss of individual hearing ability, which is indirectly progressive. In addition to auditory effects, attention should also be paid to non-auditory effects, which are the impact of noise on humans and the auditory system[4].

Occupational diseases are diseases caused by work and Working Environment. PAK risk factors between other: Physical, chemical, biological, or psychosocial at work. These factors in the work environment are Underlying and Decisive Causes of occupational diseases. Factor Others like individual vulnerabilities as well as Role in the development of the disease among exposed workers[5].

Personal protective equipment (PPE) is a tool used to protect the body from injury or illness caused by a lot of contact with hazards in the work area in the form of physical, biological, chemical, radiation, and others[6]. According to the Regulation of the Minister of Manpower and Transmigration Number PER.08/MEN/VII/2010, Personal Protective Equipment is a tool that can protect someone whose function is to isolate part or all of the body from potential hazards in the workplace. Employers or workplace owners must provide personal protective equipment for all employees in the workplace. Furthermore, workers or laborers who enter the workplace must wear or use personal protective equipment according to standards made by analyzing the potential hazards and risks that may occur in the work area, especially industry.

Ear plugs and ear muffs are a form of personal protective equipment mentioned in the Minister of Manpower Regulation, meaning that these tools must be used by all employees and workers in industrial areas associated with prolonged exposure to engine noise (noise). The sound of machines and other devices that cause noise and the condition of workers without wearing ear protection will cause a person to experience hearing

organ damage. Hearing loss that occurs repeatedly will cause permanent deafness. Apart from hearing loss, noise can also cause a person to experience emotional disturbances, headaches, increased blood pressure, and decreased work performance[7]. Because of this, in the Regulation of the Minister of Manpower and Transmigration Number PER.13/MEN/X/2011 it is explained in more detail regarding assessing the sound threshold that the body can tolerate as a preventive measure against noise. These rules stipulate that the Threshold Limit Value on the noise factor is 85 dB for 8 hours per day or 40 hours in one week.

Agro-industry is a workplace with a high risk and potential for noise exposure. Noise sources can come from various activities such as milling machines, power generators, heavy equipment, and electrical equipment such as saws and cutters[8]. Exposure to noise in the agro-industrial work area is continuous every day because it is workers' primary job and main livelihood. In the research conducted, it was found that grinding meat raw materials produced an average noise level of 88.5 dB, coffee 88.5 db, rice 88.9 db, sticky rice 87.3 db, and coconut 80.7 db. The duration of exposure to noise among meat, coffee, rice, and glutinous mill workers ranges from 9-12 hours a day. At the same time, the length of exposure to noise in coconut mill workers varies from 6-19 hours[9].

The World Health Organization (WHO, 2012) states that as many as 156 million people, or 27% of the total population, experience hearing loss in Southeast Asia, as many as 49 million individuals and 9.3% of people under the age of 65 experience hearing loss caused by sound that is strong enough to be produced from work location. Meanwhile, in Indonesia, hearing loss is the highest category in Southeast Asia, with around 6 million individuals or approximately 16.8% of the total population[10].

With this high prevalence, the researcher intends to conduct an analytical study regarding the effect of using ear protection devices (ear plugs and ear muffs) on the incidence of occupational diseases. Apart from aiming to prevent hearing loss and its complications, the use of ear protection devices will also affect work productivity in industrial work areas.

Method

1. Research design

The method used is Literature Review, namely by re-explaining information that has been published and then reviewed without reducing the essence of the topic discussion.

2. Measurement and data collection

The journal used in the preparation of this Literature Review was obtained from 3 database source, namely Google Scholar search engine, PubMed, and ScienceDirect, which was published from 2018 to 2021 using Indonesian keywords, namely "Noise" OR "Agro-industry" OR "Hearing Impaired" OR "Occupational Diseases".

Results

After searching for journal articles using the Google Scholar search engine, PubMed and ScienceDirect, according to the keywords that have been determined. Literature analysis took ten journal articles published in 2018-2023, 5 articles discussing noise, two articles discussing hearing loss, two articles discussing occupational health risks, and 1 article discussing agro-industry.

Table 1.
Literature Review Noise Hazard and Occupational Diseases In Agroindustrial Area

ID Number	Author and Journal Identity	Journal Titles	Objective	Population and Sample	Method	Summary of Results
1	Author : Choochouy N, et al Journal Identity : Annals of Work Exposures and Health, 2019, Vol. 63, No. 7, 707–718	Hearing Impaired In Agricultural Workers Exposed To Pesticides And Noise[11]	Analyze Public health education programs on hearing protection in pesticide-exposed farms, including Thai farm workers.	The population of this study recruited 163 Thai conventional farmers and 172 organic farmers.	In this study, we used the conventional method (pesticide use) and years of farm noise exposure to estimate semiquantitative metrics for pesticide exposure (years-cumulative intensity score) and cumulative noise exposure	This study found a relationship in the high-frequency band between pesticide exposure (years of use and year-exposure score use of pesticides or organophosphates) and exposure to noise (years of use or dB(A)-years) and threshold increments hearing among Thai agricultural workers while taking into account

					(dB(A)-years) for each conventional farmer.	age, industrial noise, and smoking status.
2	Author : saputra, et al Journal Identity : Journal of Health and Science, September 2020, 4(1):40-48	Rice milling factory noise level In moyo utara district[12]	Analyzing the noise level at the rice mill in North Moyo District.	The sample in this study was rice mill workers, namely 17 samples.	The type of research used in this research is descriptive research with a cross-sectional approach. The cross-sectional approach is a study to study the dynamics of the correlation between factors and risks with effects by way of approach, observation, or data collection all at once	The average yield of workers in rice mills aged 15-25 years is seven people (41.2%) with a high school education level of 7 people (64.7%) and a working period of 1-3 years is 13 people (76, 5%) with noise levels in 5 rice mills in Moyo Utara District with an average indoor NAV of 92.01 dB and an average outdoor NAV of 78.76 dB.
3	Author: Putri, et al Identity Journal : Journal of Environment and Natural Resources (JURNALIS)	The efficiency of reducing noise levels by red levels (Syzygium paniculatum) and asoka (Sarasa Asoka)[13]	Analyzing the efficiency of reducing noise levels by damping media of red shoots and Asoka plants.	Population and samples can be taken from data collection every 5 seconds for 10 minutes to produce 120 data.	The research method used is an experiment using two plant types to determine the noise level decrease.	The results of the noise level measurement show that the red shoot dampening medium can reduce noise with an initial intensity of 89.9 dB to 84.45 dB (transmission loss 5.45 dB), while the Asoka plant dampening medium can reduce the noise level to 84.9 dB (transmission loss of 5 dB).
4	Author : Haidina A, et al Identity Journal : Journal of Nursing and Public Health Vol. 8 No. April 1, 2020	Analysis of stone crusher machine noise levels and work stress complaints at workers at PT. Wheel teknindo purajaya north bengkulu 2018[8]	It is known that the noise level is at PT Roda Teknindo Purajaya Bengkulu Utara, and there are known complaints of work stress among workers at PT Roda Teknindo Purajaya Bengkulu Utara	Population and sample were taken from 35 responde nts.	This study used an analytic survey research method with a descriptive research design; namely, the research method was carried out to look at the noise level analysis of the stone crusher machine and complaints of work stress on workers at PT. Wheel of Teknindo PuraJaya North Bengkulu 2018.	Stress can be interpreted as psychological pressure that can cause physical and mental illness. Before stress occurs, each individual needs a significant and specific stressor (stressor). Psychosocial stressors are any circumstances or events that cause individual reactions in physiological, psychological, and behavioral reactions. The work environment has the potential to be a work stressor. Work stressors are all work conditions that

						employees perceive as demand and can cause work stress.
5	Author : Safiu, et al Identity Journal : MPPKI (February, 2023) Vol. 6. No. 2	The effect of noise exposure on stress levels and sleep quality of workers Agricultural products processing industry in gowa regency[14]	This study aims to determine the relationship between environmental noise exposure, work stress levels, and sleep quality.	Sampling using total sampling with the number of respondents is 50 people who work in rice mills	This type of research is analytic observational with a cross-sectional approach. This research carried out from June to September 2022. The number of rice mills used as a sample location as many as 25 mills spread across Pallangga District, Gowa Regency.	The results showed a significant relationship between the intensity of noise in the work environment and the level of stress and quality of sleep (results of p-value = 0.021; r = 0.325 and p-value = 0.020; r = 0.3328. So it can be concluded that noise based on statistical tests significantly affects stress levels and sleep quality, so control is needed for both noise sources and workers.
6	Author : Safitri Identity Journal : Journal of Ruwa Jurai Volume 15, Number 2, 2021 (page 77-84)	The effect of noise on work stress in Labor in the rice milling industry[15]	The research aims to find out impact of noise on stress on workers	The population comes from all over workers in the rice milling industry totaling 35 people divided into 2 group of 10 people working inside room, and another 25 people were working outside.	This research is an evaluation study with a quantitative approach to Get information about risks the safety of workers working on tools in the rice mill production section Anugrah Mulya, Pringsewu. The research was conducted in February-May 2019 at the Anugrah Mulya rice mill in Wates Village, Gadingrejo District, Pringsewu Regency, Lampung province.	Research result obtained that the noise intensity in the rice mill room has exceeded the NAV , equal to 87 dB(A), and causes work stress to 51.4% of workers. Age, gender , and noise also affect work stress. Measures to reduce noise exposure in the workplace and shared recreation for all workers can avoid labor work from work-related stress.
7	Author : Firdaus Identity Journal :	Potential Hearing Nerve Damage in Milling Industry	This study aims to determine the level noise generated by	This research carried out by measuring noise at	This type of research is an observational analytic with a cross-sectional	In this study, it was found that the milling of materials raw meat produces an average noise level of 88.5 dB, coffee 88.5

No	Author / Identity	Title	Purpose	Sample	Method	Results
	Vol. 6 No. 1 (2020) Journal of Agromedicine and Medical Sciences	Workers in the District Jember[16]	the grinding industry as well as analyzing the potential for damage to the auditory nerve on mill workers in Jember district	five mill locations in Jember district which randomly determined. The mill types studied were meat, coffee, rice, sticky rice, and coconut milling.	approach	db, rice 88.9 db, sticky rice at 87.3 db, and coconut at 80.7 db. Duration of exposure to noise in mill workers meat, coffee, rice, and sticky rice for around 9-12 hours daily. While the length of exposure to noise on workers Coconut grinding ranges from 6-9 hours. Therefore it can be concluded that meat grinding, coffee, Rice and sticky rice have the potential to cause hearing loss for workers.
8	Author : Leli Hesti Indriyanti, et al Identity Journal : Journal of Medicine and Health, Vol. 15, No. 1, July 2019 ISSN : 0216 – 3942 Website : https://jurnal.umj.ac.id/index.php/JKK e-ISSN : 2549 – 6883	Relationship of Noise Exposure to Increased Pressure Blood on Workers[17]	This study was conducted to identify the relationship between noise and several factors at work with the prevalence of hypertension	The sample consists of 104 workers taken from the company database, namely, workers in X workshop coming from the department different and meet the criteria inclusion and exclusion.	The type of research conducted is analytic observational with a cross-approach sectional. P	Results Respondents exposed to noise of more than ≥85 dB had a 19.8 greater risk of hypertension than those exposed to noise < 85 dB. A significant (P = 0.001) exposure-response pattern existed between hypertension risk and intensity noise exposure. This study shows that exposure to workplace noise can increase the risk of developing high blood pressure.
9	Author : Romansyah, et al Identity Journal : Scientific Journal of Agricultural and Biosystem Engineering, Vol. 6, No.	Ergonomic analysis of mechanical noise and vibration levels Peanut peeling machine Against operator security[18]	The purpose of this study is to determine the level of engine noise; for vibrations machine mechanics, and To find out the operator's security level.	This method uses a random sample so that the exact number of respondents is unknown.	The method used in a study is method experimental, consisting of three spin treatments, namely P1 = 800 rpm, P2 = 1000 rpm, and P3 = 1200 rpm.	The noise level of the peanut peeler machine at 1200 rpm (P3) was 69.8 dB, which was 69.8 dB better than the P1 800 rpm treatment, which was 75.8 dB, and the P2 treatment at 1000 rpm, which was 72.8 dB, below the noise threshold value of 85 dB(A) with a maximum exposure of

	2, September 2018					8 hours/day. And the mechanical vibration of the peeler peanuts at 1200 rpm (P3), which is 11.4 Hz, is better than treatment P1 (800 rpm), which is 13.3 Hz, and treatment P2 (1000 rpm), which is 12.4 Hz. So it can be concluded that the safety level of the machine operator Peanut peelers are classed in the low category.
10	Auditors : Setyaningsih, et al Identity Journal : JOURNAL OF PUBLIC HEALTH (e-Journal) Volume 7, Number 4, October 2019 (ISSN: 2356-3346)	Analysis of the usage of rice husk and straw as Diesel engine noise absorbing Rice milling work environment[19]	The purpose of this research that is, analyzing the use of rice husk and straw as a silencer in diesel engines to reduce noise and influence pressure blood of workers before and after treatment	This method uses a random sample so that the exact number of respondents is not known	The method in this research i.e., a quasi-experiment with using one group pre-test post-test design.10	The results of the paired t-test analysis with a 95% confidence level obtained p systolic = 0.014 and p diastolic = 0.009 ($p < 0.05$) prove a significant difference in blood pressure. In this study, it can be concluded that giving silencers from rice husks and straw can reduce noise intensity and blood pressure in rice mill workers.

Discussion

From the results of the study, it was found that the use of ear protection equipment is an essential component in preventing occupational disease. Workers in the agricultural sphere get many risk factors related to noise. Noise is a hazard from work that can cause interference or discomfort, both physical disorders and psychological disorders. Noise-induced diseases can be chronic and permanent. Therefore, it is highly recommended to use ear protection equipment.

Research by Saputra, et al (2020) states that the average result of workers in rice milling mills is 15-25 years old with a length of work between 1-3 years[12]. The study also explained that the noise level in five rice milling factories in North Moyo District was fantastic: indoor 92.01 dB and outdoor 78.76 dB. The length of exposure and the amount of noise exposure certainly have a significant impact on the body. This is in line with

research conducted by Firdaus (2019), namely that workers in the food raw material processing industry area have the potential to experience nerve damage due to noise. In his research, it was also explained that most meat, coffee, rice, and glutinous rice mill workers in the Jember district have the potential to experience hearing loss due to noise intensity that exceeds the predetermined Threshold Value (NAB) of > 85 dB and due to noise exposure that is too long 9-12 hours[16].

The strict implementation of administrative principles regarding the maximum time limit allowed for workers without hearing protective equipment, for example, using formula standards set by NIOSH, is complicated to implement in the field. It is almost impossible for a worker to leave his workplace when the deadline to deal with the noise is almost overwhelming, and the work has not yet been completed. Therefore, for the benefit of workers and work, it is appropriate if the application of the fifth hazard control principle, namely Personal Protective Equipment for hearing, is used in places that contain noise hazards. This is a possible preventive measure to prevent noise.

The study published by Setyaningsih & Kurniawan (2019) provides other interventions and solutions related to noise exposure in agroindustrial areas. According to his research, husks, and straw can help lighten the sound of rice milling machines. This result is undoubtedly an alternative and workable problem-solving. According to him, the company needs to consider using engine dampers to make the atmosphere in the work environment more comfortable and conducive. The study's results proved that rice husks and straws can reduce noise intensity in rice milling business workers[19].

In addition to using rice husks and straw, research conducted by Putri & Natalina (2020) explained that Red Shoot Plants (Syzygium paniculatum) and Asoka (Sarasa Asoka) were able to reduce noise significantly. The results of noise level measurement show that the red shoot plant damper media can reduce noise with an initial intensity of 89.9 dB to 84.45 dB (transmission loss 5.45 dB). At the same time, the Asoka plant (Sarasa Asoka) can reduce the noise level to 84.9 dB (transmission loss 5 dB)[13].

Long-term noise exposure can cause hypo and hyper reactions, which can indicate regulatory abnormalities in the axis. In addition, research conducted by Pickering states that acute and chronic stress can cause increased cytokine release, not only as a marker but also as an inflammatory mediator that causes vascular endothelial dysfunction and atherosclerosis processes. So that in the end, there is an increase in blood pressure which

can chronically cause hypertension[17]. In addition to causing imbalances in physical conditions, noise can also cause psychological disorders.

Stress can be interpreted as psychological pressure that can cause physical and mental illness. Before stress occurs, there needs to be a stressor (stressor) that is entirely meaningful and specific to each individual. A psychosocial stressor is any circumstance or event that causes an individual's reaction through physiological, psychological, and behavioral responses. Work environments with noise exposure have the potential to be work stressors. Work stressors are all work conditions that employees perceive as demanding and can cause work stress. Workers experience stress due to heavy work demands coupled with the presence of bothersome noise. This can also certainly reduce the workability of employees. According to research conducted by Safiu et al. (2023), it was found that there is a significant relationship between noise intensity in the work environment and stress levels[14].

Conclusion

From this study, it can be concluded that the presence of noise intensity that has exceeded the threshold value (85 dB) can increase the risk of increased blood pressure of workers, leading to workplace hypertension. In addition, noise can also cause stress because it is one type of stressor in the workplace. It is, therefore, important to plan various preventive measures to reduce noise exposure in the workplace. One of the methods discussed in this study is according to the recommendation of the Minister of Manpower regarding the use of Ear Protective Equipment (Earplug and ear) properly and correctly.

Acknowledgment

Conflict of Interest

There is no conflict of interest.

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