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THE RELATIONSHIP OF NOISE EXPOSURE TO JOB STRESS IN SAND MINING WORKERS IN THE BANJARBARU CITY AREA

Luna Yussy Puspita, Arifin, Junaidi, Zulfikar Ali As
Banjarmasin Ministry of Health Polytechnic, Department of Environmental Health
Jl. H. Mistar Cokrokusumo No. 1A Banjarbaru South Kalimantan 70714
E-mail: lunayussypuspita@gmail.com

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ABSTRACT

The Relationship of Noise Exposure to Job Stress in Sand Mining Workers in The Banjarbaru City Area. Noise is the sound of an inappropriate place and time. Workplace noise problems are a source of stress that causes psychological imbalances. Sources of noise in the workplace come from operating machines, such as sand mines in Cempaka and Banjarbaru, which contribute to workplace noise. Sand mines use diesel engines; the engine sound is loud enough that all workers in the mine are exposed to the noise. Workers who are exposed to high-intensity noise experience work stress. The study aimed to determine the relationship between noise exposure and work stress among sand mining workers in Banjarbaru. This observational-analytic study used a cross-sectional design. Observations were made on 25 workers who were exposed to noise. The data were analyzed using the Pearson correlation test. The results of noise measurements in sand mines ranged from 72.1 dBA to 88 dBA, with noise exposure for each worker ranging from 65.5 dBA to 83.7 dBA and work stress scores ranging from 34.12% to 50.7%. Statistically, there is an association between noise exposure and work stress. It is recommended to check the diesel engine, lubricate it to reduce noise in old and poorly maintained engines, use ear protection devices, such as ear plugs and ear muffs, to reduce noise exposure, and rotate every job task, especially for workers around diesel engines.

INTRODUCTION

Noise and all pollutants are serious environmental nuisances. Noise can reduce the quality of life and cause real harm to human health. This is common among people who work in factories or with operating machines. (1)

The American Psychological Association (APA) defines work stress as pressure and tension experienced by employees in the workplace arising from factors such as demanding work schedules, relationships between co-workers, and others related to their work, one of which is noise in the environment. workplace. (2) Job stress is a condition that arises as a result of interactions between individuals and their work, where there is a mismatch of characteristics and unclear changes that occur within the company. (3)

Workplace noise issues can have a significant impact on psychological well-being, leading to increased stress levels. (4) Noise can serve as a source of stress, leading to an increase in alertness and psychological imbalance. The psychological impact of excessive noise is to reduce workers' tolerance for other stressors and reduce work motivation. Workers' noise is

considered a dangerous stress generator. [5] The impact of stress on workers varies depending on the level of predictability and accountability. Stress can cause problems with workers' health, disruption in the workplace, society, and their families. [6]

Workers themselves, as well as the company, can experience the psychological impact of stress. Work stress for oneself results in decreased psychological and physical health. Psychological impacts include being lazy at work, lack of enthusiasm, lack of motivation to work, and being absent, while physical impacts include dizziness while working, heart palpitations, irregular breathing, and excessive sweating. The company's loss is a reduction in work results, both in quality and quantity. [7]

Age, gender, nutritional status, and years of service can also influence job stress. Age can influence the level of stress a person experiences. Based on Wichert's research results, older workers tend to experience less stress compared to younger workers. Gender also influences the stress caused by work. According to research in the United States, women have higher levels of stress than men. Apart from that, nutritional status is one of the causes of fatigue. A worker with excellent nutrition will have better work capacity and body endurance, and vice versa. The working period is related to the worker's experience dealing with problems at work. Munandar suggests that working periods associated with work stress can lead to boredom at work. [8]

The source of noise in the workplace comes from operating machines, such as sand mines in the Cempaka District area of Banjarbaru City. Sand mines use diesel engines with loud enough noise so that all workers in the mine are exposed to the noise. Even though the sand mine is an open place, the noise intensity is relatively high. This is supported by the fact that machines are rarely maintained; apart from that, the use of inappropriate fuel, such as adding oil to diesel fuel to save costs, also has an impact.

Several studies state that there is a relationship between noise exposure and work stress. According to Dian Safitri's research findings, noise and work stress have a significant impact on workers in the rice milling industry. Research found that as many as 51.4% of workers experienced work stress due to continuous exposure to noise. Age, gender, and noise are also related to work stress (p-value <0.05). [9] According to research conducted by Sumardiyono, Reni Wijayanti, Hartono, and Maria Theresia Sri Budiastuti, noise indirectly increases blood pressure, both systolic and diastolic, through individual stress response mechanisms. [10]

The aim of this research is to determine the relationship between noise exposure in sand mines and work stress among workers in the Banjarbaru City area.

MATERIALS AND RESEARCH METHODS

This research was analytical observational, using a cross-sectional design, and was conducted in a sand mine in the Cempaka District, Banjarbaru City. The population in this study consisted of 25 sand mining workers in the Banjarbaru City Area. This study had no sample because researchers surveyed the entire population.

The variables studied were noise exposure as the independent variable and the work stress of sand mining workers as the dependent variable. Data collection was carried out by measuring noise in the sand mine using a sound level meter and measuring work stress using a work stress questionnaire.

Noise was measured using a DSM-814-type sound level meter for each worker, and the worker's exposure time was recorded. Noise measurements were carried out when the machine was operating for 10 minutes and read every 5 seconds, so that the amount of data collected was 120 pieces. Noise exposure received by workers is calculated based on the noise level received and the exposure time using the following formula:

$$Tkek = 10 \log Ftotal + 85$$

Information:

Tkek = Equivalent continuous noise level (dBA)

F =t/ 8 antilog (0.1(dB-85))

Through interviews, the level of stress among workers was measured using the Depression Anxiety Stress Scale 42 (DASS-42) questionnaire. The DASS-42 questionnaire consists of 42 statements to measure negative emotional stress symptoms. This questionnaire uses 4 scales in its measurement results, with score weights including 0 (never), 1 (sometimes), 2 (often), and 3 (very often). The measurement results were obtained in a standard manner. This research questionnaire's scoring, which used a Likert scale, can influence factors such as age, gender, nutritional status, and length of service.

Data analysis in this study used the Pearson correlation statistical test by correlating noise exposure in sand mines with work stress in sand mine workers.

RESEARCH RESULTS AND DISCUSSION

The river sand mine in Banjarbaru City's Cempaka area has been operating for two years using a shift work system. The duration of noise exposure for workers remains relatively consistent, ranging from 2 to 3 hours per day during a single work shift. Each worker has unique duties and responsibilities. Of course, these various worker roles affect each worker's work location. There are workers who work close to diesel engines, and there are also those who work at a certain distance.

After carrying out noise measurements, it was discovered that the noise in the sand mine was as presented in Table 1

Table 1. Noise Intensity in Sand Mines

No	Work location	Noise Intensity (dBA)
1	Parts around the diesel engine	88
2	Sand box section	82.7
3	Worker rest area	72.1

The highest noise intensity was 88 dBA, specifically at the location around the diesel engine, while the lowest was 72.1 dBA, specifically at the worker's rest area. This situation demonstrates that noise exposure in sand mines does not exceed the threshold limit value (NAB) based on time.

The results of measuring the noise exposure received by sand mining workers showed that the smallest was 65.5 dBA, and the largest was 83.7 dBA. The accumulated noise exposure for each worker does not exceed the NAB according to PERMENKES No. 70 of 2016 concerning Industrial Work Environment Health Standards, namely a maximum of 85 dBA for 8 hours. [11]

The results of measuring the level of work stress among 25 sand mining workers can be seen in Table 2.

Table 2. Job Stress Experienced by Sand Mining Workers

No	Classification of Job Stress Levels	Number of Workers (people)	Percentage (%)
1	Light Work Stress	7	28
2	Moderate Job Stress	18	72
	Amount	25	100

According to the table above, the majority (72%) of sand mining workers in the Cempaka area of Banjarbaru City experience moderate work stress, and only the remaining 28% experience light work stress.

The Pearson correlation test between noise exposure and work stress experienced by sand mining workers produced a value of p = 0.013, or less than α = 0.05, while the R value for this correlation was 0.491, which means it is moderately correlated.

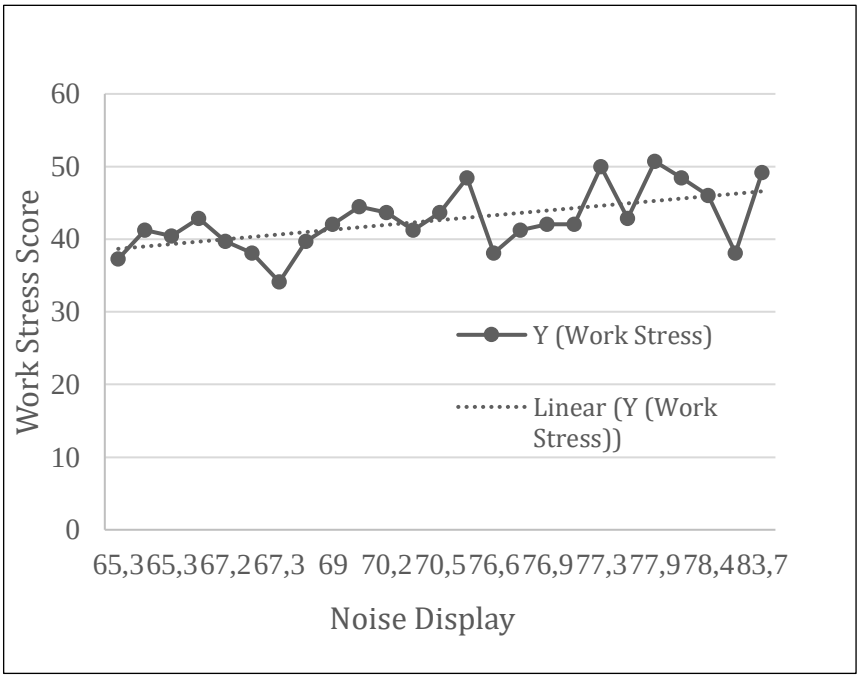

Figure 1. Graph of the relationship between noise exposure and work stress The Banjarbaru City Area is home to sand mining workers.

In the picture above, it can be seen that the correlation between noise exposure and work stress leads to a positive correlation, namely that the greater the noise exposure received by sand mining workers, the greater the level of work stress experienced by the worker. This research is in line with research conducted by Apladika, Hanifa Maher Denny, and Ida Wahyuni, who measured the stress level of ground handling porter Kokapura Ahmad Yani, where as many as 41.7% of respondents experienced moderate levels of stress due to high noise exposure. As many as 20.8% of respondents did not experience stress, while 41.2% of workers who were exposed to low noise experienced mild stress. The Spearman Rank test results show that there is a significant relationship between noise exposure and work stress in Kokapura ground handling porter Ahmad Yani [12].

Exposure to noise for a long time can cause disorders in the form of increased blood pressure, communication problems, feelings of discomfort, lack of concentration, irritability, stress, and fatigue. [13] Although sand mining workers may not be exposed to noise for a prolonged period in a single day, the repetitive nature of their work may potentially lead to stress. Repeated exposure to noise can lead to decreased work performance due to stress and other

health issues. Stress caused by exposure to loud noise can cause premature fatigue, anxiety, and depression. (14)

According to the Indonesian Ministry of Health (2012), noise can cause physiological, psychological, and organic pathological disorders. Work stress is one example of a psychological disorder caused by noise. (15) Noise in the workplace can have an impact on employees' communication and psychological disorders. If this happens continuously, it will trigger work stress. (16) According to Wahyu, in the employment sector, work stress is a problem for the health of workers, has the potential to increase the risk of work accidents, which will cause a lot of material losses, and can reduce overall work productivity. (15)

CONCLUSIONS AND RECOMMENDATIONS

The noise intensity in sand mines in the Cempaka area of Banjarbaru City ranges from 72.1 to 88 dBA, depending on the work location. Workers' noise exposure results range from 65.5 dBA to 83.7 dBA, so it does not exceed the NAB according to PERMENKES No. 70 of 2016 concerning Industrial Work Environmental Health Standards. As many as 72% of workers experienced moderate work stress, and statistically, it was proven that there was a relationship between noise exposure and work stress experienced by workers with a value of p = 0.013. The person in charge of the engine is advised to check the diesel engine periodically and lubricate the engine so that the noise produced by the engine can be reduced. Workers are expected to wear ear protection, such as ear plugs and ear muffs, to reduce noise exposure. Apart from that, there is a need for work rotation, especially for those around diesel engines, so that workers do not receive repeated exposure to noise.

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