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The Role of Noise on the Level of Work Stress in Production Employees of PT. X

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ABSTRACT

Introduction: Noise affects the level of work stress, which can cause disturbance of the work atmosphere and impact on occupational safety and health.

Objective: This study aims to determine the role of noise on occupational stress levels.

Methods: Quantitative research with Cross Sectional research design. Population of all workers in the Production Department of PT X. Sampling using total sampling totalling 94 people. The data collection method was conducted by interview. Work stress variables were measured using an instrument adopted from the OSI-R™ (Occupational Stress Inventory–Revised Edition) by Osipow & Spokane in 1998 and noise measurements in the production room using a list of Sound Level Meter noise measuring instruments.The data was analysed using the Chi-Square Test.

Results: The results obtained almost half of the respondents experienced noise as many as 31 respondents (33%) and most experienced moderate stress levels as many as 68 respondents (72.3%). Statistical test results obtained there is a correlation between noise and work stress level (P-Value = 0.009).

Conclusion: There is a relationship between noise and the level of work stress in Production Employees of PT X. For workers, it is expected that workers comply with using noise Personal Protective Equipment (PPE) such as earmuffs or ear plugs, and implement the policy of using PPE properly.

Keywords: Noise, Occupational Health, Occupational Safety, Work Stress Levels

INTRODUCTION

The sheer number of machines rapidly producing essential goods is evidence of the continued rapid development of industry and technological advancement (Asmarani, 2017). Good companies ensure the safety and health of their employees by establishing regulations that must be followed. Employees must be protected from occupational hazards and illnesses. Healthy workers can perform their jobs productively, which is expected to increase worker productivity (Robi Rojaya Simbolon et al., 2024).

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Occupational Safety and Health (K3) is very influential, because the impact of accidents in the workplace is not only detrimental to employees, but also to the company (Hidayatullah & Tjahjawati, 2018). K3 can affect workforce productivity. If workers are in a healthy condition, it will have a significant impact on better performance. Employees are an important component of a company. Employees actively participate in implementing plans, processes, systems, and goals that the company wants to achieve (Victorio Isliko et al., 2022). The level of productivity achieved by a company shows how efficiently the company combines its existing resources (Fithri & Sari, 2016). In workforce management, occupational safety and health are significant components because in every industrial process, there are sources of danger that can threaten workers.(Patradhiani et al., 2022).

Job stress is a condition that causes physical and psychological imbalance, which can affect an employee's emotions, thought processes, and condition (Syahril Budiman Pasaribu et al., 2024). Work environment factors and individual factors can cause job stress. Job stress is when a worker feels uncomfortable at work because they cannot meet the demands of their job (Rarahayu Candraditya & Endang Dwiyanti, 2017). Job stress can have a significant impact on workers' emotions and moods (Roi Heppi Durman Malau & Intan Ratnawati, 2024). Environmental, organizational, and individual factors are three sources of job stress (Irkhami, 2015). Wiyono in Febriana (2016) stated that employees consider a noisy work environment as a dangerous source of stress (Febriana, 2016).

A 2015 survey by the Institute of Families and Work found that workplace noise caused 25% of workers to experience work stress (Atang Kusman et al., 2015). The WHO states that production equipment and factory machinery produce loud noises that are detrimental to health (Yani Kamasturyani & Ani Nurhaeni, 2023). Unnecessary noise can negatively impact the quality of life, health, and well-being of humans (Halil et al., 2015). The noise threshold is 85 dBA and an 8-hour workday (Muslih Nasution, 2019). Previous research by Tri Okta et al. in 2021 regarding the relationship between noise and work stress in workers at PT.X found that noise has a relationship with work stress (Ratnaningtyas et al., 2021).

A preliminary study conducted in April 2024, using noise measurements in the production area, was conducted at three test points: the inner front side, the inner right corner, and the inner left corner of the production building. The noise intensity results were 81.9 dBA, 84.6 dBA, and 90.6 dBA, respectively. This indicates that noise in these areas exceeds the TLV and has the potential to cause work disruption. And a preliminary study of 10 workers in the production department found that workers with a moderate level of stress risk were 6 workers (60%), light as many as 3 workers (30%), and heavy as many as 1 worker (10%). Meanwhile, the noise results showed that as many as 6 workers (60%) stated that there was no noise, and as many as 3 workers (30%) stated that there was noise, the data showed that there was a problem with the level of work stress due to noise experienced by workers. The purpose of this study was to analyze the role of noise on the level of work stress in employees in the production department of PT. X.

MATERIALS AND METHODS

This research was conducted using a quantitative approach with a *cross-sectional design*. The population of all workers in the Production Department of PT. X was 94 respondents. Total sampling was used as a sampling technique. The inclusion criteria were production workers who were willing to be respondents, while the exclusion criteria were workers with hearing impairments and workers who were rarely exposed to noise. The instrument used in this study was an adaptation of previous research. The data collection method was by interviewing the level of work stress and measuring noise at three points in the production room. Work stress variables were measured using an instrument adopted from the OSI-R™ (Occupational Stress Inventory–Revised Edition) by Osipow & Spokane

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in 1998 and noise measurements in the production room using a list of Sound Level Meter noise measuring instruments.The data analysis used was the *chi-squared statistical test*. This research has gone through an ethical licensing process, with the ethical licensing number 89/B/STIKes Crb/IX/2024.

RESULTS

Table 1. Characteristics Respondents

Variables	Amount	Presentation
Gender		
Man	36	38%
Woman	58	62%
Education		
Junior High School	17	18%
Senior High School	66	70%
S1	11	12%
Citizenship		
Indonesian citizens	72	77%
Foreign nationals	22	23%
Position		
Supervisor	2	2%
Staff	92	88%

Based on Table 1.1 Characteristics respondents obtained more from half of it type female sex, namely as much as 62%, Respondents' education part high school major, namely as much as 70%, some the majority of Indonesian citizens are 77%, and most of them are position respondent staff that is as much as 88%.

Table 2. Distribution of Noise Frequency and Job Stress Level

Variables	Amount (n)	Percentage (%)
Noise		
No Noise	63	67
Noisy	31	33
Stress Work		
Stress Level Light	23	24.5
Moderate Stress Level	68	72.3
High Stress Levels	3	3.2
Total	**94**	**100**

Based on Table 2, it is known that respondents who experienced noise in the Production Section were mostly not noisy, as many as 63 respondents (67%). And almost half of the respondents experienced noise, as many as 31 respondents (33%). The level of work stress experienced by respondents was

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that the majority of respondents experienced moderate stress (68 respondents or 72.3%), almost half of them experienced mild stress (23 respondents or 24.5%), and a small number of them experienced severe stress (3 respondents or 3.2%).

Table 3. Correlation of Noise with Stress Levels Working in the Production Department of PT. X

Noise	Job Stress Level								P Value
	Mild Stress		Moderate Stress		High Stress		Amount		
	n	%	n	%	n	%	n	%	
No Noise	22	29.7	52	70.3	0	0	74	100	0.009
Noisy	1	5.0	16	80	3	15	20	100	
Total	23	24.5	68	72.3	3	3.2	94	100	

Based on Table 3, the results show that a small portion of respondents who stated that noise was present experienced high stress, namely 3 (15%). And respondents who stated that there was no noise mostly experienced moderate stress, namely 52 (70.3%). From the results of the statistical test, *the P-value was obtained* = 0.009. Therefore, there is a correlation between noise and work stress levels. In the Production Department of PT. X.

DISCUSSION

The results of noise research in the Production Department of PT. X, there were 31 respondents (33%) experiencing noise. According to observations conducted by researchers, almost half of the respondents experienced noise while working at the 1st measurement point of the Production Department, getting noise levels of 90.4 dBA above the NAB. This indicates that noise at that point occurs due to the lack of effectiveness of control measures carried out, such as control of noise sources, namely production machines, control of transmission lines, and hearing protection.

The results of this study are comparable to research conducted by Yusmardiansyah in 2022, which found that 53.5% of total workers experienced noise in *the blower* and *power house sections* (17), and Friska's research in 2022 found that 11 people (27.9%) experienced noise (Friska Irgita Kusuma Ningrum et al., 2022).

The large percentage of noise measurement results that indicate that one measurement point in the Production Section produces a value above the NAB of 90.4 dBA in this study is caused by the lack of effectiveness of noise control measures carried out such as control of noise sources, namely not all production machines are installed with barriers as noise dampers, control of transmission lines such as the use of metal in production machines is still found rather than impact-absorbing materials (plastic, rubber, nylon, etc.) so that it can prevent vibrations that cause noise and hearing control through observation is still found that employees do not use *earplugs* when operating machines.

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The results of the work stress level in the Production Department of PT. According to Table 2, there are 3 respondents (3.2%) who experience high levels of work stress. This indicates that a small number of respondents experience high levels of work stress due to frequent exposure to noise from production machines used every day, ranging from 86.2 dBA to 93.1 dBA. In addition, there is a lack of compliance with the use of hearing protection devices such as *earmuffs* and *earplugs.* Also, be a cause of the level of work stress in the respondents.

The results of this study are similar to the research conducted by Aripta Pradana in 2014, which found that 12 respondents (24%) experienced high levels of work stress (Aripta Pradana, 2013), and research conducted by Anggi et al. in 2020 found that 23 people experienced moderate work stress and 7 people experienced high levels of work stress (Parinduri et al., 2020). This study shows that a small proportion of respondents experienced high levels of work stress. In accordance with the statement by Rarahayu Candraditya and Endang Dwiyanti in 2017, the causes of work stress are due to work environment factors and individual factors (Rarahayu Candraditya & Endang Dwiyanti, 2017).

The results of this study found a significant correlation between noise and work stress levels (P-v*alue* = 0.009). The results of this study are similar to several previous studies, which stated that there is a significant relationship between noise and work stress, with P-Value = 0.018 (Ratnaningtyas et al., 2021). Minister of Manpower Regulation number 5 of 2018 concerning Occupational Health and Safety (K3) in the work environment stipulates that noise measurement and control must be carried out in the workplace where the source of noise hazard comes from the operation of work equipment or machinery. If the results of workplace noise measurements exceed the NAB, then noise control needs to be carried out (Lukmanul Hakim et al., 2023).

The results of this study indicate a correlation between noise and work stress levels. A small percentage of respondents working in noisy environments (3 respondents, 15 %) experienced high levels of stress. This is due to suboptimal noise control efforts. Facilities that support workers in safe working practices are urgently needed, such as replacing metal tools or machines with plastic, nylon, and other materials to prevent vibrations that cause noise

CONCLUSIONS

The results of the respondents mostly stated that there was no noise, with as many as 63 respondents (67%). And almost half of the respondents stated that there was noise, as many as 31 respondents (33%). Work stress results obtained from respondents showed that most of the respondents experienced moderate stress levels (68 respondents or 72.3%), almost half of them experienced mild stress levels (23 respondents or 24.5%) and a small number of them experienced severe stress levels (3 respondents or 3.2%) and There is a correlation between noise and work stress levels in Production Department workers at PT. X with *p value* = 0.009.

For workers, it is expected that workers comply with the use of noise-protecting PPE such as *earmuffs* or *earplugs* and implement policies for the proper use of PPE. Companies should make efforts to control noise by replacing work process tools and materials, eliminating noise sources from the workplace, and installing sound barriers/dampeners for some or all of the equipment. The researcher suggests that future researchers use a larger sample size and add more independent variables to the study.

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Availability of data and materials

Data on noise and work stress were primary data collected through interviews and observations. Secondary data in this study, in the form of work report documents, were collected through document review.

Authors' contributions

The first author's contribution was prepare the research proposal and draft the article. The other authors contributed to data provision and data processing.

Conflict of Interest

This research has no conflict of interest.

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