



Association between Individual Factors and Occupational Stress among Operational Workers at PT Terminal Petikemas MNO

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ABSTRACT

Interpersonal relationships in the workplace can often develop into competition, which may impose psychological burdens on employees. In addition, work-related factors can also contribute to employees' psychological strain. Performance targets that must be achieved, strict deadlines, and high expectations from supervisors or colleagues are common triggers of work-related stress. The purpose of this study was to identify individual factors and job-related factors among operational workers at PT Terminal Petikemas MNO and to analyze the relationship between individual factors and job-related factors with work stress among these workers. This study employed a descriptive-analytic design with a cross-sectional approach. The population consisted of 281 employees, with 74 respondents selected as samples using the Slovin formula. The sampling technique used was simple random sampling. Data were collected through a work stress questionnaire and workload assessment using the NASA-TLX questionnaire. Bivariate analysis was conducted using the Spearman correlation test to examine the relationships between variables. The results showed that 5 respondents experienced mild stress, 3 respondents experienced moderate stress, and 66 respondents experienced severe stress. The bivariate analysis using the Spearman test indicated a significant relationship between individual factors, such as age and level of education, and work stress. Therefore, it is recommended that the company reduce workload, provide training programs, and organize activities such as employee outings at least once a year.

1. INTRODUCTION

Occupational safety and health (OSH) is a crucial aspect in maintaining workers' productivity and well-being. The International Labour Organization (ILO) reports that approximately 2.78 million workers die each year due to occupational accidents and work-related diseases, of which 2.4 million cases (86.3%) are attributed to occupational diseases (ILO, 2020). Data from Indonesia indicate a significant increase in cases of occupational accidents and work-related diseases, with 265,334 cases recorded from January to November 2022 (BPJS Ketenagakerjaan, 2021). These figures underscore the need for serious attention to health risk factors in informal work environments, including motorcycle repair workshops.

Motorcycle repair workshops represent one of the rapidly growing service sectors in line with the increasing number of motor vehicles in Indonesia. Workshop workers are potentially exposed to various hazardous chemical substances, such as organic solvents, benzene, toluene, heavy metals (lead, mercury, manganese), and particulates from combustion emissions and paints (Hasanah, Widodo, & Prabowo, 2021). Exposure to these chemicals is neurotoxic in nature and may cause disturbances to both the central and peripheral nervous systems, including cognitive impairment, mood changes, tremors, and chronic fatigue (Ira, 2016; WHO, 2020). Neurotoxic symptoms are defined as adverse changes in nervous system function resulting from exposure to chemical substances or neurotoxic physical and biological agents (Ira, 2016). Previous studies have shown that industrial workers exposed to toluene have a higher risk of experiencing cognitive impairment, headaches, and sleep disturbances (Faradisha, 2018). Other research has found that workshop workers with chronic exposure to organic solvents experience mild tremors, increased fatigue, and difficulty concentrating (Hasanah et al., 2021).

Despite strong evidence regarding the effects of neurotoxic exposure across various industries, research specifically addressing the risk of neurotoxic symptoms among motorcycle repair workshop workers in Surabaya remains limited. This is particularly concerning given that motorcycle workshops are part of the informal sector, where OSH implementation is relatively low, potentially leading to greater long-term health risks.

Therefore, this study aims to analyze the risk of neurotoxic symptoms among motorcycle repair workshop workers in Surabaya using the validated Q18 questionnaire to detect neurotoxic symptoms in working populations. The findings of this study are expected to provide an initial overview of the magnitude of neurological health risks in the motorcycle workshop sector and to serve as a basis for formulating preventive and risk control policies related to OSH in informal work environments.

2. METHOD

This study employed a descriptive-analytic design with a cross-sectional approach. This design was selected to examine the relationship between individual factors (age, highest educational attainment, and nutritional status) and the level of work stress among operational workers within a specific time period, without long-term follow-up. This approach is widely used in occupational health research because it allows for the efficient and timely identification of relationships between variables (Ariani, 2014). The study was conducted at PT Terminal Petikemas MNO, located in Surabaya, East Java. This site was chosen because it is one of the largest container terminals in Indonesia and is characterized by a high workload in the operational division. Data collection was carried out from March to May 2025. The study population comprised all operational workers at PT Terminal Petikemas MNO, totaling 281 employees. The sample size was determined using the Slovin formula with a margin of error. Samples were selected using a simple random technique, in which each member of the population had an equal probability of being selected. This technique was applied to minimize

selection bias and ensure that the sample was representative of the population.

Work stress was measured using a work stress questionnaire consisting of 20 items rated on a 5-point Likert scale (1–5). Instrument validity was tested on 30 workers outside the study sample, yielding calculated correlation coefficients ($r_{\text{calculated}}$) greater than the r_{table} value (0.361), indicating that the questionnaire was valid. Reliability testing using Cronbach's alpha produced a coefficient of 0.86, indicating very high reliability.

Subjective workload was assessed using the NASA Task Load Index (NASA-TLX) questionnaire, which comprises six dimensions: mental demand, physical demand, temporal demand, performance, effort, and frustration level. The questionnaires were self-administered by respondents under the supervision of the researcher.

Nutritional status was assessed by measuring body weight and height to calculate body mass index (BMI). Univariate analysis was conducted to describe the frequency distribution of age, educational level, nutritional status, and work stress levels. Bivariate analysis was performed using the Spearman Rank Correlation test to determine the relationship between individual factors and work stress. Statistical significance was established at a p -value < 0.05 with a 95% confidence level.

3. RESULTS

Respondent Characteristics

This study involved 74 operational workers as respondents. Respondent characteristics were examined based on age, highest educational attainment, and nutritional status. The distribution of respondents according to these characteristics is presented in Table 3.1

Table 3.1 Responden Distribution

Characteristic	Category	Frequency	Percentage (%)
Age	Late adolescence (18–25 years)	7	9.5
	Early adulthood (26–35 years)	13	17.6
	Late adulthood (36–45 years)	29	39.2
	Early elderly (46–55 years)	25	33.8
	Highest educational attainment	Elementary school	1
Highest educational attainment	Junior high school	8	10,8
	Senior high school	37	50,0
	Diploma	4	5,4
	Bachelor's degree	18	24,3
Nutritional status (BMI)	Underweight	10	13,5
	Normal	29	39,2
	Overweight	25	33,8
	Obesity class I	7	9,5
	Obesity class II	3	4,1

Based on Table 3.1 the majority of respondents were in the late adulthood age group (39.2%), had a senior high school level of education (50.0%), and had a normal nutritional status (39.2%).

Distribution of Work Stress Levels

The measurement of work stress levels indicated that the majority of respondents experienced severe work-related stress. The distribution of work stress levels is presented in Table 3.2

Table 3.2 Distribution of Work Stress Levels

Work Stress Level	Frequency (n)	Percentage (%)
Mild	5	6,8
Moderate	3	4,1
Severe	66	89,2

These findings indicate that nearly nine out of ten operational workers experienced severe work-related stress, reflecting the high level of work pressure among the study respondents.

Association between Individual Factors and Work Stress Association between age and work stress

The Spearman correlation analysis showed a statistically significant association between age and work stress ($p < 0.001$; $r = 0.446$). The positive correlation coefficient indicates that higher age was associated with higher levels of work stress among workers.

Table 3.3 Results of the Spearman Correlation Analysis between Age and Work Stress

Variabel	p-value	Correlation coefficient (r)	Interpretation
Age ↔ Work Stress	< 0.001	0.446	Significant, moderate positive correlation

Association between Educational Attainment and Work Stress

There was a statistically significant association between highest educational attainment and work stress ($p < 0.001$; $r = -0.492$). The negative correlation coefficient indicates that higher levels of education were associated with lower levels of work stress.

Table 3.4 Results of the Spearman Correlation Analysis between Educational Attainment and Work Stress

Variabel	p-value	Correlation coefficient (r)	Interpretation
Educational attainment ↔ Work stress	< 0.001	-0.492	Significant, moderate negative correlation

Association between Nutritional Status and Work Stress

The analysis of the relationship between nutritional status and work stress showed no statistically significant association ($p = 0.167$; $r = 0.162$). This finding indicates that nutritional status was not significantly associated with work stress among the workers.

Variabel	p-value	Correlation coefficient (r)	Interpretation
Educational attainment ↔ Work stress	0.167	0.162	Not significant

4. DISCUSSIONS

The results of this study indicate that the majority of operational workers at PT Terminal Petikemas MNO experienced severe work-related stress (89.2%). This condition suggests that work in the container terminal sector is characterized by a high level of occupational pressure. Such pressure may arise from strict performance targets, heavy physical and mental workloads, occupational accident risks, and interpersonal relationships in the workplace.

According to Robbins (2006), work stress may be triggered by several factors, including task demands, role demands, interpersonal relationships, organizational structure, and leadership. Among operational workers, high task and role demands, combined with leadership styles that emphasize performance targets, may serve as primary contributors to work stress. These findings are consistent with reports from the International Labour Organization (ILO, 2020), which state that workers in the logistics sector tend to experience relatively higher levels of work stress compared to those in other sectors.

The analysis revealed a statistically significant association between age and work stress ($p < 0.001$; $r = 0.446$). The positive correlation indicates that increasing age is associated with higher levels of work stress. This finding is in line with the study by Fitri (2013), which reported that older workers tend to experience higher stress levels than younger workers. This phenomenon may be explained by the increasing responsibilities faced by older workers, both in the workplace and within their families. In addition, age-related physical decline may reduce workers' capacity to cope with heavy job demands (Hasibuan, 2013). However, other studies have shown that older workers may possess more effective coping strategies compared to younger workers (Kurniawan et al., 2019). This suggests that age not only influences the level of work stress but also affects individuals' ability to manage stress.

This study also found a significant association between educational attainment and work stress ($p < 0.001$; $r = -0.492$). The negative correlation indicates that higher levels of education are associated with lower levels of work stress. This finding is consistent with the study by Irkhani (2015) on offshore industrial divers, which demonstrated that higher education equips workers with better cognitive abilities, communication skills, and coping strategies for managing occupational pressure. Education may also provide access to more strategic job positions with relatively lower physical workloads (Mangkunegara, 2011). Conversely, workers with lower educational levels (junior and senior high school) may have limited problem-solving skills, making them more susceptible to stress when facing workplace challenges (Candraditya et al., 2017).

In contrast to age and education, this study did not find a significant association between nutritional status and work stress ($p = 0.167$). This finding suggests that physiological factors such as nutritional status are not primary determinants of work stress among operational workers. The results differ from those of Candraditya et al. (2017), who reported an association between nutritional status and stress levels among healthcare workers. This discrepancy may be attributed to differences in job characteristics, as work in container terminals is more strongly influenced by external factors such as workload, work relationships, and performance demands rather than by workers' physiological conditions. Nevertheless, maintaining adequate nutritional status remains important, as good physical condition can support workers' stamina in performing daily physically demanding activities (WHO, 2021).

The findings of this study have several important implications for company management. Older workers may require workload adjustments or placement in positions with lower physical risk. The company should also provide continuous training opportunities to enhance the skills of workers with lower educational backgrounds, enabling them to better

cope with workplace challenges.

Although nutritional status was not significantly associated with work stress, the company should continue to provide health programs, such as regular medical check-ups and access to sports or fitness facilities. Psychological counseling, stress management training, and recreational activities may serve as effective strategies to reduce work stress levels (ILO, 2020; Ministry of Manpower of the Republic of Indonesia, 2022).

This study has several limitations. The use of a cross-sectional design limits the ability to infer causal relationships. In addition, the study focused solely on individual factors and did not include organizational variables such as shift work, leadership style, and social support. Furthermore, work stress was measured using a subjective questionnaire, which may introduce perception bias.

5. CONCLUSION

This study demonstrates that the majority of operational workers at PT Terminal Petikemas MNO experienced severe work-related stress. Age and highest educational attainment were found to be significantly associated with work stress levels, whereas nutritional status did not show a significant association. Therefore, companies need to consider individual worker characteristics when designing stress management programs, such as training, counseling, and social support initiatives, to reduce the risk of work stress and enhance productivity.

The company should develop more targeted stress management programs by taking into account differences in workers' age and educational background. Such programs may include job skills training, psychological counseling, and the provision of rewards or recognition as a form of appreciation for employee performance. In addition, the company is encouraged to create a more supportive work environment by strengthening open communication between workers and supervisors, as well as organizing regular social activities such as outings or family gatherings to reduce psychological pressure. Workload management should also be optimized to achieve a better balance, particularly for workers with lower educational backgrounds who may be more vulnerable to work stress. From the workers' perspective, improving mental health literacy and coping skills is essential to enable them to respond more adaptively to job demands and to make effective use of counseling services provided by the company to maintain psychological well-being.

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