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THE RELATIONSHIP BETWEEN SMOKING HABITS AND WORK STRESS AMONG BOARD OPERATORS IN ELECTRICITY COMPANIES IN INDONESIA: CROSS-SECTIONAL STUDY

Hubungan Kebiasaan Merokok Dengan Stres Kerja Pada Operator Board di Perusahaan Listrik di Indonesia: Studi Cross Sectional

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ABSTRACT

Background: The 2019 National Socio-Economic Survey showed that 92.1% of active smokers were workers. An increase in risky behaviour such as smoking can be a cause of stress in working individuals**. Purpose**: This study aimed to determine the strength of the relationship between smoking habits and occupational stress in board operators**. Methods:** This is a quantitative research design. The type of research used was observational with a cross sectional approach. Sampling using the total population of 52 people. The independent variable (smoking habit) was measured using the Penn State Nicotine Dependence Index and the dependent variable (work stress) was taken with the Workplace Stress Scale questionnaire. The strength of the relationship test was carried out with the contingency coefficient test to determine the strength of the relationship between variables**. Results:** 30 respondents (57.7%) do not smoke. While 30 respondents (57.7%) had work stress levels mostly in the moderate stress category. The results of the strong relationship showed c = 0.254 which means a weak relationship between smoking habits and occupational stress. **Conclusion:** Most of board operators do not have a smoking habit and experience moderate work stress and there is a weak relationship between smoking habits and work stress.

Keywords: smoking habit, work stress, board operator.

ABSTRAK

Latar Belakang: *Survei Sosial Ekonomi Nasional 2019 menunjukkan sebanyak 92,1% perokok aktif berasal dari kalangan pekerja. Peningkatan perilaku berisiko seperti kebiasaan merokok dapat menjadi penyebab stres pada individu pekerja.* ***Tujuan:*** *Penelitian ini bertujuan untuk menentukan kuat hubungan kebiasaan merokok dengan stres kerja pada operator board.* ***Metode:*** *Ini adalah penelitian kuantitatif. Jenis penelitian yang digunakan adalah observasional dengan pendekatan cross sectional. Sampel menggunakan total populasi yaitu sebesar 52 orang. Variabel independen (kebiasaan merokok) diukur dengan menggunakan Penn State Nicotine Dependence Index dan variabel dependen (stres kerja) diambil dengan kuesioner Workplace Stress Scale. Uji kuat hubungan dilakukan dengan uji koefisien kontingensi untuk mengetahui kuat hubungan antar variabel.* ***Hasil:*** *30 responden (57,7%) tidak merokok, sedangkan 30 responden (57,7%) tingkat stres kerja mayoritas dalam kategori stres sedang. Hasil kuat hubungan menunjukkan c = 0,254 yang memiliki makna hubungan lemah antara kebiasan merokok dengan stres kerja.* ***Kesimpulan:*** *Sebagian besar board operator tidak memiliki kebiasaan merokok dan mengalami stres kerja sedang serta terdapat hubungan lemah antara kebiasaan merokok dengan stres kerja.*

Kata Kunci: *kebiasaan merokok, stres kerja, operator board.*

INTRODUCTION

Smoking is a global health problem. The number of smokers worldwide has reached 1.3 billion people with the majority aged 15 years and over (Drope *et al.*, 2018;) Salsabila *et al*., 2022). The 2019 National Socio-Economic Survey showed that 92.1% of active smokers came from among workers (Satriawan, 2022). (*Global Adult Tobacco Survey*, 2012) stated that as many as 51.3% of smokers in Indonesia smoke in the workplace (Amalia, 2017). Research conducted by (Oviera & Jayanti (2016) which shows that workers show smoking habits as much as 75%. Other research also states that the majority of workers have a smoking habit, namely 72% (Sholihah & Tualeka, 2015). Workers feel smoking is normal for productive age workers in the workplace (Sholihah & Tualeka, 2015;) Wiyathama & Inayah, 2021). A person who has a smoking habit generally also experiences a tendency that is difficult to avoid cigarettes.

European Agency for Safety and Health Work (2023) stated that individuals in low-skilled occupations generally experience more Works strain than individuals in high-skilled occupations. jobs with physical inactivity and repetitive work such as work on board operators provide higher psychosocial and emotional demands. Work demands are faced by workers with various coping, which can be positive coping or negative coping. Negative coping that is commonly done by workers is smoking. Smoking activities are considered to have become part of everyday life. Smoking habits are considered by smokers to provide pleasure, but on the other hand cigarettes have a bad impact on the smoker himself or the people around him, especially the bad impact on health (Rifa'i, 2013;) Rahayu, 2017). Smoking has been proven to damage a person's health condition; it does not rule out the possibility that smoking also affects the psychological health condition of workers.

European Agency for Safety and Health Work (2023) mentioned that work environment conditions can trigger an increase in risky behaviours in individual workers that are sustained such as smoking. This risky behaviour can be a secondary cause of stress. The content of substances in cigarettes, especially nicotine, can affect the psychological condition, nervous system, and brain activity and function for smokers. The psychological effects caused by nicotine include, smokers experiencing a decrease in the ability to recognise emotions and tend to be depressed (Liem, 2010) in Libuka, 2019). There are differences in activity in the brains of smokers and non-smokers, namely differences in the ventral, dorsal, and mesolimbic network areas and the relationship between brain disorders and psychological disorders such as anxiety disorders, depression, irritability, anxiety, difficulty concentrating, and compulsive behaviour (Liem, 2010). In addition, smoking has been shown to be one of the strongest factors in increasing depressive symptoms (Goodman & Capitman, 2013 in Nasution & Nuralita, 2020).

Stress is the body's process of adapting to external influences and changes in the environment. In general, stress is defined as mental tension caused by difficult situations. This situation is a natural response in humans that encourages a person to be able to overcome the challenges and threats that occur in his life (World Health Organization, 2023). Manuaba 1998 explained that stress is a form of stimulation or activity of the human body, either from outside or from within the human body, where these stimuli or activities can cause various impacts ranging from decreased health to the emergence of a disease (Tarwaka, 2019). Work stress describes a natural reaction in the human

body that arises because of job demands that exceed one's abilities and/or resources (Safework South Australia, 2012;) Koc & Bozkurt, 2017). National Institute for Occupational Safety and Health (2020) work stress is defined as an unnatural physical and emotional response due to a mismatch between work demands and the abilities, resources, or needs of the worker.

Workers' responses to stressors are both positive and negative *(Safework South Australia*, 2012) meaning that a stressor may be stressful for some people but may not be the same for others. Everyone experiences stress to some degree. It is how a person responds to stress that makes the difference (World Health Organization, 2023), it could be that the stressor becomes a challenge or a disaster for others. It is influenced by several factors both from work and outside of work. According to Patton (1998), these factors include individual conditions, personality traits, socio-cognitive, and each person's strategy in dealing with stress that arises (Tarwaka, 2019).

Continuous work stress will cause worker burnout and increase the emergence of unsafe behaviour which results in work accidents. The research of Farid *et al*., (2019) stated that there is a relationship between work stress and work accidents. This is in line with the Loss Causation Model theory which states that the root cause of work accidents (in this case work stress) can affect the occurrence of direct causes (unsafe actions). The theory is in line with research by Palupi (2015) which stated that there is a significant relationship between work stress in night shift workers and dangerous behaviour. Data from BPJS Ketenagakerjaan recorded that in 2019 work accidents reached 144,000 cases, while in 2020 there was an increase, reaching 177,000 cases (Widianto, 2021). The number of cases is obtained from the number of claims submitted by workers who have suffered work accidents, with the actual number of cases being much higher.

Other studies have proven several factors that cause occupational stress in operator workers, including work shifts and workload, which are factors that cause stress caused by work conditions. It is still difficult to find research that examines the causes of occupational stress caused by individual conditions of workers, especially occupational stress due to smoking habits. Over the past 10 years most occupational safety and health commissions have promoted the approach that psychosocial risks and stress are part of occupational safety and health. Therefore, this study aimed to analyse the strong relationship between smoking habits and occupational stress in PT PLN Nusantara Power UP Paiton 9 PLTU board operators.

METHOD

This study used quantitative research design. The type of research used was observational with a cross sectional approach in which this research was conducted at a certain time span with the aim of describing the condition of the population under study. The statistical analysis used was descriptive statistical analysis describing frequency distribution and cross tabulation. This research was conducted at PT Perusahaan Listrik Negara Nusantara Power UP Paiton which took place from December 2022 to January 2023. The population and sample in this study were all workers in the operator section, namely operators of the Central Control Room (CCR), Control Handling Control Building (CHCB), Water Treatment Plant (WTP) totalling 52 people. The sample was selected using the total population technique of 52 people.

The research data used was primary data obtained through filling out the Penn State Nicotine Dependence Index (PSNDI)

questionnaire to determine the smoking habits of workers. This questionnaire was converted into Indonesian with the results of the validity test showing that five of the seven items showed valid results, namely with r => 0.361. Reliability test results with Cronbach Alpha test showed a value of 0.729. The results of the validity and reliability tests of the PSNDI questionnaire showed that five of the seven questionnaire items proved to be valid and valid. Measurement of occupational stress using the same WSS questionnaire had also been converted into Indonesian and the validity test showed valid, namely each question item showed r =>0.50 with the results of the Cronbach Alpha reliability test>0.07, so the 8 items of the WWS instrument were declared valid and reliable (Ulfah, 2011). The categorisation of sleep quality and work stress was divided into three groups based on the results of quartile one, quartile two, and quartile three (Azwar, 2008). The categories for smoking habit were no smoking, low smoking habit, and high smoking habit. Categories for job stress were low, medium, high. Data were processed using SPSS software version 18.0 and analysed using cross tabulation tables and narratives. The strength of the relationship between variables was measured using the contingency coefficient (c) test because in this study the data scale used was ordinal data (categorical) using the total population method.

Tabel 1. Interpretation Value of Coefficient of Contingency

C Score	Description
0,000-0,199	Very Low
0,200-0,399	Low
0,400-0,599	Moderate
0,600-0,799	Strong
0,800-1,000	Very Strong

Source : Sugiyono (2015)

Every step in the study was in accordance with the principles of research ethics, by providing an explanation before the study verbally and informed consent sheets to all respondents as a form of written consent. This research has passed the ethical test at the Ethics Commission of the Faculty of Dentistry, Universitas Airlangga with certificate number of: 015/HRECC.FODM/I/2023.

RESULT

Univariate Analysis

Data presentation in univariate analysis included data of age, smoking habits, and work stress.

Table 2. Respondent Characteristic

Respondent Characteristic	Frequency	Percentage (%)
Age		
17-25 years	2	3,8%
26-35 years	41	78,8%
36-45 years	9	17,3%
Smoking Habits		
No smoking	30	57,7%
Low smoking habit	9	17,3%
High smoking habit	13	25%
Work Stress		
Low	9	17,3%
Middle	30	57,7%
High	13	25%

Table 2 explained the respondent characteristics consisted of 52 respondents. Respondents were dominated by those aged 26-35 years which was 41 people (78.8%). The table showed that most board operators have a habit of not smoking which was 30 people out of 52 people (57.7%), while workers who have a high smoking habit were in second place which was 13 people (25%). Regarding the amount of work stress, most workers experience moderate work stress, amounting to 30 people out of 52 or 57.7%.

Bivariate Analysis

The results of the bivariate analysis between sleep quality and work stress are presented in the following tabulation:

Table 3. Tabulation of Cross Relationship between Sleep Quality and Work Stress

Smoking Habit	Work Stress						Contingent Coefficient Value (c)
	Low		Moderate		High		
	n	%	n	%	n	%	
No smoking	3	10	18	60	9	30	0,254
Low smoking habit	3	33.3	5	55.6	1	11.1	
High smoking habit	3	23.1	7	53.8	3	23.1	

The results of the bivariate analysis in Table 3 showed that of the 52 board operators, 30 workers with a non-smoking habit experienced moderate work stress which was 18 people or 60%. While 9 workers or 30% experienced high work stress. The majority of nine workers with low smoking habits also experienced moderate work stress which was 5 people or 55.6%. Most workers with high smoking habits experienced moderate work stress was 7 people or 53.8%. The results of the contingency coefficient value showed that the value (c) = 0.254, which means there was a weak relationship between smoking habits and work stress on the PT PLN Nusantara Power UP Paiton 9 PLTU board operator.

DISCUSSION

Based on their smoking habits, the majority of workers at the PT PLN Nusantara Power UP Paiton PLTU board operator have certain characteristics. (Oviera & Jayanti (2016) research indicated that 75% of workers have a smoking habit. Moreover, based on another study, 72% respondents were having smoking habit (Sholihah & Tualeka, 2015). According to (Sholihah & Tualeka, 2015), smoking is a habit among employees since they think it is common for those who smoked when they were younger. This can be used as justification for why board operators at PLTU PT PLN Nusantara Power UP have a greater habit of abstaining from smoking than do employees who work indoors or in the office (Oviera & Jayanti (2016). Since they work indoors, it minimizes the possibility of smoking freedom.

Work stress on the PT PLN Nusantara Power UP Paiton PLTU board operator showed that most workers have a work stress level in the medium category of 57.7% based on the results of research using the Workplace Stress Scale questionnaire. In addition, the work stress level in the high category is in second place which was 23%. Based on the cross-tabulation results in Table 3, it can be concluded that most workers who did not smoke have moderate levels of stress that were greater than the moderate work stress experienced by workers with a high smoking habit. This showed that there was a weak relationship between smoking habits and work stress. In contrast to research (Liem

(2010) which stated that there are changes in brain activity between smokers and non-smokers due to the correlations between smoking behavior and multiple brain locations. Brain problems such as anxiety disorders, sadness, irritability, restlessness, difficulty concentrating, and compulsive behavior are caused by activity in certain brain areas and result in psychological illnesses.

Other than that, there are two causation paths in the complicated correlation between smoking behaviors and work stress. If smoking is linked to work stress, as stated in the previous statement, there is also evidence to suggest that smoking generally reduces tension, facilitates concentration, and has a relaxing effect. It makes smoking behavior for the subject one of enjoyment and pleasure (Nasution, 2019). Hence, smoking is an alternative way to escape from stressful situations.

The moderate stress experienced by board operators is interpreted as meaning that work tends to make workers experience stress but this condition can still be overcome (The Marlin Company & American Institute of Stress, 2001). The board operator is the operator who is responsible for monitoring the operating system on the monitor in each control room area. In order to achieve reliability and continuity of electricity supply in accordance with the plant operating system schedule, the operator monitoring board in the Central Control Room is designed to monitor, control, and operate the system in accordance with the merit order that has been set by the load control center (Prayogo & Widajati, 2017). The purpose of the monitoring board operator in the water treatment plant room is to oversee and monitor every step of the raw water processing into process water (free of minerals and deminerals), which is a necessary step in the production of electrical energy (Pasra & Hakim, 2015). Monitoring by the operator board in the Coal Handling Control Building room is intended to regulate the storage and use of coal according to the calories determined in coal management, where coal is the main fuel in the power generation system (Tampubolon, 2014).

Board operators engage in passive work activities, which is one of the features of monitored employment. According to the European Agency for Safety and Health Work, employees in low-skilled occupations often face more job strain than those in high-skilled occupations (2023). Increased psychosocial and emotional demands are associated with repetitive jobs that involve little physical effort, such board operator workers. Work that involves repetitive tasks and monotony is also monitoring work. These routines influenced the workers to get bored and stimulate them to get stressed (Zulkifli *et al.*, 2019).

Another factor that causes the weak relationship between smoking habits and work stress is that workers who have a smoking habit are social smokers. Smoking is used as a social interaction activity which is considered an idiom of distress, giving other people a signal that they are stressed. Thus, fellow smokers provide mutual understanding and help manage stress. Qualitative research also proved that smoking is a way to rest, refocus, and manage social relationships (Nichter *et al.*, 2007).

The existence of a two-way causal relationship between smoking habits and work stress is a limitation of this research. In addition, since non-smoking workers who are exposed to cigarettes (passive smokers) may also be exposed to nicotine, which can affect the presence of work stress, more research needs to be carried out on the factors that go along with smoking. One such factor is the effect of nicotine on non-smokers. To test workers for smoking behaviors, the Penn

State Nicotine Dependence Index can be used to measure factors such as quantity and frequency of use, impulse to use, impaired control, and sensory dependence. PSNDI also has other measuring instruments that are used specifically to measure electronic cigarettes. Hence, their use can be adjusted to developments in the use of electronic cigarettes which is increasing rapidly.

CONCLUSION AND SUGGESTION

Based on the research results, it is known that most board operators are 26 - 35 years old. Most workers do not have a smoking habit and have moderate work stress. The relationship between smoking habits and work stress on the PT PLN Nusantara Power UP Paiton 9 PLTU board operator has a weak relationship. As a result, additional evaluation of the factors associated with smoking was carried out, including the impact of nicotine on non-smokers. This is because non-smoking workers who are exposed to cigarettes (passive smokers) may also be exposed to nicotine.

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AUTHOR CONTRIBUTION

The first author, Dhea Aulia Hera Wardoyo has duties and responsibilities in determining the topic, location, and research sample; taking data, both primary and secondary data; and carrying out data analysis. However, the second author Yustinus Denny Ardyanto Wahyudiono has duties and responsibilities as a supervisor who provides approval for research topics and samples; and provides meaningful input and corrections at each stage.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest in this study.

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