



Factors Influencing Musculoskeletal Disorders among Operators at Public Fuel Stations on Perintis Kemerdekaan Street in Makassar City

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Abstract

Musculoskeletal disorders (MSDs) are issues felt in the skeletal muscles or skeletal muscles of a person, ranging from very mild to very painful. Factors causing musculoskeletal complaints include excessive muscle stretching, repetitive activities, unnatural working postures, secondary causes, and combined causes. Common symptoms of CVS include eyestrain, blurred vision, headaches, eye dryness, and neck and shoulder strain. This research aims to analyze the impact of gender, working posture, work duration, and physical activity on musculoskeletal disorders among operators at public fuel stations on Perintis Kemerdekaan Street Makassar City. This research employs a cross-sectional method design that combines a quantitative approach. The study population consists of 140 respondents, with a quantitative sample size of 115 respondents from operators at Public Fuel Stations on Perintis Kemerdekaan Street Makassar City. Quantitative data obtained through direct observation using questionnaires, processed with SPSS. The study finds the results of a bivariate analysis using the chi-square test, indicating that factors influencing musculoskeletal disorders are working posture ($p=0.014$), work duration ($p=0.002$), length of service ($p=0.005$), and physical activity ($p=0.007$). In addition, there was no effect of gender ($p=0.749$) on musculoskeletal disorders among operators at public fuel stations on Perintis Kemerdekaan Street in Makassar City. These findings of this study support employees by educating them about the factor that can cause a musculoskeletal disorder.

Keywords: Musculoskeletal Disorders, Gender, Working posture, Work Duration, Length of Work, Physical Activity

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1. Introduction

In 2018, the World Health Organization (WHO) stated that musculoskeletal complaints are the second highest cause in the world, where complaints of low back pain are the cause of disability globally. The Health and Safety Executive (HSE) revealed that the prevalence of musculoskeletal complaints in Europe amounted to 469,000 out of 1,358,000 all these occupational diseases occurred in 2017-2018. Work-related musculoskeletal complaints account for 24% of all lost working days in Europe. An estimated 6.6 million working days were lost due to musculoskeletal complaints in workers with an average of 14 working days lost in each case, when viewed from the previous year this is not statistically different. [1]. Individual factors include age, gender, Body Mass Index (BMI), exercise habits, and smoking habits. Occupational factors include work attitude or posture, repetitive movements, work duration, and length of service. [2]. Data from the Badan Pusat Statistik (BPS) shows that 26.74% of the population aged 15 years and over who work experience complaints and health problems. From the data of Akbar et al., 2024

the Ministry of Health, it found that there were 40,694 cases of occupational diseases. One of the occupational diseases is musculoskeletal complaints caused when the work process is not ergonomic.

In various industries, there are studies on MSDs that show the existence of muscle complaints that workers often feel, including in the muscles of the neck, hands, fingers, shoulders, back arms, waist and muscles in the lower part of the worker. Most musculoskeletal events do not result in disability but rather make workers feel disturbed while doing their work. [3]. One workplace that has the potential to experience Musculoskeletal Disorders (MSDs) complaints is the Operator of Public Fuel Filling Stations (SPBU). SPBU is one of the workplaces that has great potential for work accidents for both the workers themselves and the people in the area. This place is a public infrastructure provided by PT Pertamina for the wider community to meet the needs of vehicle fuel. The construction of gas stations aims to improve the quality and efficiency of the implementation of fuel oil distribution aimed at all levels of society. [4]. The increase in

the number of TPAK every year shows that currently, women are increasingly active in taking part in the world of the national economy and have the same opportunities in the field of work as men. Women act as a wife or mother in the household, but it does not rule out the possibility for women to do work, this commonly referred to as multiple roles.

Women who work outside the home, who also manage the household, will cause various complicated problems and feel difficulties that will affect women's performance at work, because of a dual role conflict between work and family [5]. Performance is the result achieved by someone according Exercise habits can also reduce a person's risk of experiencing musculoskeletal disorders and exercise habits that carried out regularly can improve quality of life, prevent osteoporosis, and other bone diseases [6-9]. Lack of exercise is a risk factor for chronic musculoskeletal disorders in medical practitioners, but the severity of MSDs in dentists can decrease with regular exercise. Exercise three times a week for 20 weeks shown to reduce the risk of MSDs [10]. Based on the background description, and what described above, musculoskeletal complaints are a common problem suffered by gas station operators in carrying out their duties. Therefore, the researcher considers it necessary to understand the conditions of complaints that experienced by workers, especially gas station operators and provide an overview of complaints related to Musculoskeletal Disorders in gas station operators along Jalan Perintis Kemerdekaan Makassar City.

2. Materials and Methods

This study uses analytic observational research with a cross-sectional approach. This research was conducted from April to May at 7 (seven) gas stations along Jalan Perintis Kemerdekaan Makassar City with a total of 115 respondents selected using proportional random sampling technique. The variables in this study are gender, work posture, length of service, length of work, and physical activity as independent variables and musculoskeletal disorders (MSDs) complaints as dependent variables. Data regarding the characteristics of respondents such as gender, length of service and length of work obtained through direct interviews using a questionnaire. Musculoskeletal disorders measured using the Nordic Body Map questionnaire with two categories: high and low, and work posture measurements measured using the Rapid Entire Body Assessment (REBA) method with two categories: good posture and bad posture. Data processing carried out using the SPSS application to identify the effect of the independent variable on the dependent variable. This data analysis uses univariate analysis and bivariate analysis. The results of the study presented in table form. This study has received approval from the health research ethics commission (KEPK) Faculty of Public Health, Hasanuddin University on 3 April 2024 with protocol number: 26324062105 and letter number: 893/UN4.14.1/TP.01.02/2024.

3. Results and discussion

Based on Table 1, the results of the univariate analysis found that regarding work posture, there were 56 people (48.7%) with poor work posture and 59 people (51.3%) with good work posture. Regarding the working period, 65 people (56.5%) were old operators who had worked for more than 3 years, 50 people (43.5%) were new workers. Regarding the

length of work of operators, 66 people (57.4%) were not qualified because they worked more than 8 hours per day, and 49 people (42.6%) were qualified. Furthermore, regarding sports activities, 75 people (65.2%) were categorized as unqualified because they only did sports activities less than 3 times a week and 40 people (34.8%) were categorized as qualified with sports activities more than or at least 3 times a week. Regarding the distribution of musculoskeletal complaints, 71 people (61.7%) experienced high complaints and 44 people (38.7%) experienced low complaints. Based on Table 2, the results of the bivariate analysis indicate that work posture significantly influences musculoskeletal disorders, with a chi-square test result of $p = 0.014$ ($p < 0.05$). Additionally, work duration ($p = 0.002$, $p < 0.05$), length of work hours ($p = 0.005$, $p < 0.05$), and physical activity ($p = 0.007$, $p < 0.05$) also show significant effects. However, there is no significant influence of gender ($p = 0.749$, $p < 0.05$) on musculoskeletal disorders among operators at the public fuel filling stations on Perintis Kemerdekaan Street, Makassar

3.1. The Effect of gender on Musculoskeletal Disorders Among Operators at Public Fuel Station on Perintis Kemerdekaan Street in Makassar City

Gender can affect the risk of muscle complaints, this is due to physiology, and male muscle strength is greater than female. The ability of female muscles is two-thirds of the ability of male muscles, so that the muscle capacity of men is greater than women. Based on observations in the field was found that 115 respondents who experienced high Musculoskeletal Disorders (MSDs) complaints, the highest category was for male workers, namely 48 respondents (41.7%) and the low category was for female workers, namely 23 respondents (20.0%). As for respondents who experienced low Musculoskeletal Disorders (MSDs) complaints, the highest category was for male workers, namely 31 respondents (27.0%) and the lowest category was for female workers, namely 13 respondents (11.3%).

The results of data analysis using the chi-square test obtained a value of $p = 0.749$ ($p > 0.05$), this means that it can be interpreted that gender has no relationship with complaints of Musculoskeletal Disorders among operators on Public Fuel Station at Perintis Kemerdekaan Street Makassar City. Men and women have the same risk of musculoskeletal complaints up to the age of 60 years, but in reality, a person's gender can affect the onset of complaints. In women, these complaints are more common, for example when experiencing the menstrual cycle, besides that the menopause process can also cause reduced bone density [11]. According to the results of research, theory and related research, researchers argue that there is no relationship between gender and MSDs because there is no difference between men and women to experience MSDs disorders, depending on the work activities and workload they do.

3.2. The Effect of Work Posture on Musculoskeletal Disorders among Operators at Public Fuel Station on Perintis Kemerdekaan Street in Makassar City

One of the aspects considered in ergonomic posture or work attitude. It stated that work attitude is the various positions of the worker's limbs during work activities. The division of work attitudes in ergonomics based on body position and movement. A natural work attitude is a work attitude.

Table 1. Characteristics of Respondents

Characteristics of Respondents		Frequency	
		n	%
Gender	Man	79	68.7
	Woman	36	31.3
Work Posture	Poor	56	48.7
	Good	59	51.3
Work Duration	> 3 years	65	56.5
	≤ 3 years	50	43.5
Length of Work	Unqualified	66	57.4
	Qualified	49	42.6
Physical Activity	≤ 3 times a week	75	65.2
	> 3 times a week	40	34.8
Musculoskeletal Complaint	High	71	61.7
	Low	44	38.3

Table 2. Results of Bivariate Analysis on Operators of Public Fuel Station on Perintis Kemerdekaan Street

	Musculoskeletal Disorder
Gender	0.749
Work Posture	0.014
Work Duration	0.002
Length of Work	0.05
Physical Activity	0.007

*p-value < 0.05: there is a significant effect

That causes the position of body parts to move away from the natural position, for example, the movement of the hands raised, the back is too bent, and the head raised. The farther the position of the body part from the center of gravity of the body, the higher the risk of skeletal muscle complaints. Unnatural work attitudes occur because the characteristics of task demands, work tools, and work areas are not in accordance with work capabilities and limitations [12]. In this study, the chi-square test result was $p=0.014$, this means that it can be concluded that work posture has a relationship with complaints of musculoskeletal disorder among operators at public fuel stations on Perintis Kemerdekaan Street in Makassar City. Improper work posture will add to the risk because it requires maintenance of muscle strength. If this situation repeated for a long time, MSDs are three times more likely than workers who do it in a shorter time [13]. Improper posture increases the risk of MSDs on the cervical spine, chest, and lumbar spine by at least double. The speed of carrying out improper posture is also a consideration. The speed factor is indicated by the number of technical actions (in minutes) performed by the worker, given the work that demands more than thirty actions per minute [14].

3.3. The Effect of Work Duration on Musculoskeletal Disorders among Operators at Public Fuel Station on Perintis Kemerdekaan Street in Makassar City

Workers who have worked for a long time, and have a heavy workload can cause muscle aches and pains because they constantly burdened. Workers with long working hours are 1.6 times more likely to develop MSD symptoms than those who work shorter working hours [15]. Based on observations in the field, the result of the chi-square test wick had a value of $p=0.002$, that means the working period has a relationship with complaints of musculoskeletal disorders among operators at public fuel stations on Perintis Akbar et al., 2024

Kemerdekaan Street in Makassar City. There is a significant relationship between the duration of work and musculoskeletal complaints. This is based on musculoskeletal disorders will not appear spontaneously or directly, but gradually until the human ability begins to feel pain [15]. Respondents who had a working period of one to five years mostly experienced low-risk complaints and others experienced moderate-risk musculoskeletal complaints. Based on the results of the analysis test, the p-value obtained to be smaller than the significance level value determined by a weak correlation coefficient value, meaning that there is a weak relationship between the working period and musculoskeletal complaints. Where there is still a positive or unidirectional correlation direction, namely the longer a person's working period, the higher the level of musculoskeletal complaints [16].

3.4. The Effect of Length of Work on Musculoskeletal Disorders among Operators at Public Fuel Station on Perintis Kemerdekaan Street in Makassar City

Length of work the time in carrying out work done at work. Too long a working duration can cause workers to develop Musculoskeletal Disorders. Long working time leads to an asymmetrical muscle imbalance, which leads to muscle pain, a manifestation of musculoskeletal disorders. Working time above 8 hours can significantly cause pain in the upper limbs such as shoulders, upper back, lower back, and arms [17]. The results of the chi-square test obtained in this study found a value of $p=0.005$ ($p<0.05$), this means that it can be concluded that the length of work has a relationship with complaints of Musculoskeletal Disorders in Public Fuel Station Operators on Perintis Kemerdekaan Street in Makassar City. Working hours extend the working time beyond these abilities and usually not accompanied by high efficiency it usually seen to decrease productivity and a

tendency to fatigue, illness, and accidents. The maximum break 1 hour while between working hours must provide with breaks, which amount to between 15-30% of the entire working time. If the working hours exceed these provisions, things such as a decrease in work speed, and health problems, can result in a low level of work productivity. This can be at risk of muscle pain that will cause Musculoskeletal Disorders [18]. Field conditions where when transitioning between shifts are less organized and the condition the queue of motorists who want to fill up with gasoline is quite long, resulting in the operator appearing to be in a hurry to do his job. and making the operator have to take a little more time before changing shifts with the operator who will be on duty next [19]

3.5. The Effect of Physical Activity on Musculoskeletal Disorders among Operators at Public Fuel Station on Perintis Kemerdekaan Street in Makassar City

Exercise done correctly and correctly is very beneficial for the body. The portion of exercise must adjusted to the ability of each individual's body so that no exercise is too heavy or exercises that are too light [20]. The data analysis using the chi-square test revealed a p-value of 0.007 ($p < 0.05$), indicating a significant relationship between sports activities and complaints of Musculoskeletal Disorders among Public Fuel Station Operators on Perintis Kemerdekaan Street, Makassar City. This finding aligns with Hurdiah's research in 2022, which showed that workers at PT Sukses Mantap Sejahtera (SMS) lack physical freshness due to inadequate physical activity. The chi-square test in that study yielded a p-value of 0.025 ($p < 0.05$), indicating a similar relationship between energy-demanding work, inadequate rest, and physical well-being [21]. The more often a person does exercise habits, the higher the level of freshness of the body will be. A high level of body freshness will certainly reduce the risk of muscle injury. According to the NIOSH report, it stated that with a high level of body freshness, there would only be a 0.8% risk of experiencing muscle complaints while a low level of body freshness will increase the risk of complaints by 7.1% [22].

4. Conclusions

This study concluded that there is an influence between work posture, length of service, length of work, and sports activities. While there is, no influence between genders on complaints of musculoskeletal disorders Among Operators at Public Fuel Stations on Perintis Kemerdekaan Street in Makassar City.

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