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Analysis of working posture risk of office employees in one of the ports companies using the ROSA method

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Abstract

Ports are one of the logistics sector industries that is experiencing rapid growth from year to year. One of the ports in East Kalimantan, Indonesia, is experiencing a rapid increase in activity, which is supported by the development of the Indonesian Capital City (IKN). This condition also causes an increase in the activities of office workers in the managerial and administrative fields at the port. Office area workers generally spend most of their time in front of computers. Therefore, office area workers are at risk of experiencing musculoskeletal disorders (MSDs) because they are in a static and monotonous position. This research was an observational study using a cross-sectional approach. This research aimed to assess work posture ergonomically using the ROSA method to determine the risk of MSDs owned by office area workers. Assessment of work posture is carried out by observation using the ROSA sheet. The research results showed that most workers (58.33%) had a risk of MSDs in the warning level category, and the remainder (41.67%) had a risk of MSDs in the Necessity of Intervention Measures category. The causes of the high risk of MSDs in office workers are less ergonomic workstations and low awareness among workers regarding ergonomic working posture. Therefore, port companies, in this case, need to make improvements by rearranging workstations, creating health information media about ergonomics, and providing ergonomics training to workers.

Keywords: Ergonomics; Musculoskeletal disorders; Office Ergonomics; ROSA; Work posture

1. Introduction

The logistics industry is one of the industries that drives rapid national development growth. The Central Statistics Agency explained that from 2018 to late 2019, there has been an increase in loading and unloading activities for foreign shipping at several 25 strategic ports in Indonesia. The figure for the increase in logistics dismantling from 2018 to 2019 was 349,095 tons[1]. The high increase in loading and unloading activities causes an increase in occupational safety and health risks because logistics activities are increasingly busy and intensive.

One of the port companies in Kalimantan is increasingly experiencing increased loading and unloading activities. This port is one of the busiest ports in East Kalimantan. In this case, the port serves passenger shipping, general cargo, containers, liquid bulk, solid bulk, and many more. The port will face increasing goods flows in line with the National Capital (IKN) designation in East Kalimantan. The existence of IKN development will increase people's interest in moving to cities that support IKN. This condition will cause increased activity at the port.

The increase in activity at the port has resulted in an increase in the activity of workers in the office who are engaged in managerial and administrative areas such as recording and billing notes for loading and unloading activities, payments for the use of heavy equipment services, accounts receivable notes, and many more. Based on observations that have been made, workers in office areas spend most of their time working in front of computers and require high concentration. As for carrying out their work, office workers have monotonous work activities such as typing and staring

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at the screen for too long in a sitting position. In this case, office workers have minimal movement variations and have static and prolonged positions. This work generally requires little movement but can cause muscle contractions, leading to pain if maintained for a long time due to tense muscles.

Excessive use of computers will cause workers to complain about ergonomic problems. The type of work done in front of a computer is often associated with awkward postures, static sitting positions that last a long time and are done repeatedly in the upper limbs, increased muscle activity in the upper back and shoulders, as well as work duration and time pressure[2]. This condition can occur due to problems with equipment, facilities, and work layout. It can also be caused by working environmental conditions or a combination of these various factors. An inappropriate workplace layout will force workers to adopt work postures that are not ergonomic[3]. Therefore, if the frequency of computer use does not pay attention to ergonomics, it will cause risks to workers[4].

Based on the Regulation of the Minister of Health of the Republic of Indonesia Number 48 of 2016 about Office Occupational Safety and Health Standards, working in front of a computer with frequent typing, repetitive head movements from the keyboard, and monitoring more than once a minute over a long period will cause muscle and bone disease. Employees who do not balance computer use according to ergonomic factors will cause the body to become tired easily, which can result in changes in bone structure[5]. Apart from that, based on brief interviews with several office workers, it is known that there are complaints such as back and shoulder pain. Therefore, researcher want to study the working posture of office workers using the ROSA method so that workers' risk of musculoskeletal disorders (MSDs) is known and that improvements to working positions can be evaluated immediately.

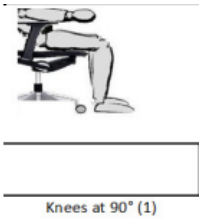
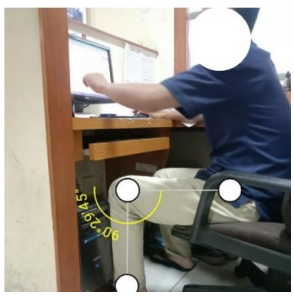
2. Material and methods

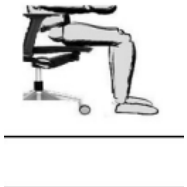
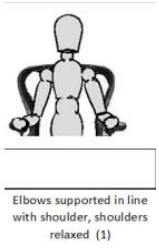
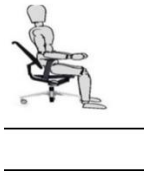
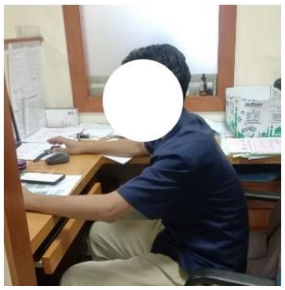
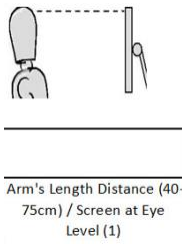
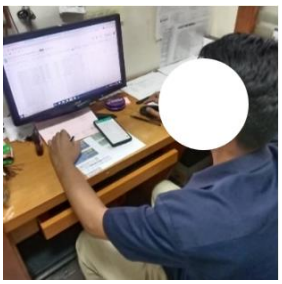
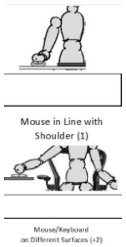
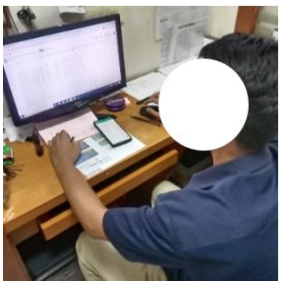
This research was an observational descriptive study using a cross-sectional approach. The research used the total population in the office, namely 12 employees. The method used in this research is the ROSA (Rapid Office Strain Assessment) method, one of the office ergonomics methods. In this case, ROSA is designed to measure the risks associated with computer use and determine the action level for change. The working posture was obtained based on observations by researchers following the ROSA observation sheet and carried out when workers were doing their work in front of the computer. Risk factors for computer use include several aspects such as the computer, monitor, mouse, and keyboard. These various factors are given values ranging from 1-3. Furthermore, at the end of the assessment, a score varies from 1 to 10. The ROSA score is divided into three categories based on the level of MSDs risk. The MSDs risk level category has been divided into 3, namely: "Low" for a score of 1-2, "Warning Level" for a score of 3-5, and "Necessity of intervention measures level" for a score >5. The Low category has a slight risk of MSDs. The Warning Level category has a risk of MSDs if left untreated for a long period, and the Necessity of Intervention Measures level category means the worker's condition is considered very at risk of experiencing MSDs and further improvements must be made to the workplace immediately or the work posture adopted by the worker[6].

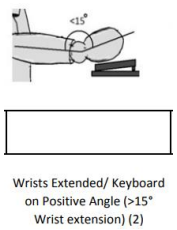
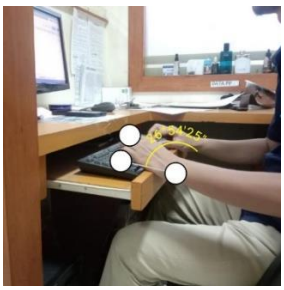
3. Results and discussion

Work posture assessment used the ROSA form based on the observed subject. Data processing is carried out by determining scores in parts A, B, and C and the final score. The data processing based on the ROSA form can be seen as follows:

Table 1 Scoring of work posture scores based on the ROSA observation sheet

Section A			
1.	Chair height 		1 (knees are at a 90° angle) + 1 (seat cannot be adjusted)

2.	Pan depth 		2 (distance between knee and edge of seat exceeds 3 inches) + 1 (not adjustable)
3.	Armrest 		1 (elbows supported in line with shoulders, shoulders relaxed) + 1 (unadjustable)
4.	Back support 		2 (worker's back is too forward) + 1 (cannot be adjusted)
So, section A score (Chair Score) is armrest + back support → 2+3 = 5; chair height + pan depth → 2 + 3 = 5. These numbers will be used to find the overall chair score using table section A + duration score, in this case, + 1 for more than 4 hours a day.			
Section B			
1.	Monitor 		Score 1 (at arm's length (45-75 cm) + 1 (without document holder) + 1 (duration exceeding 4 hours a day)
2.	Telephone	-	0
So, the section B score is the monitor with a score of 3 and the telephone with a score of 0. The obtained numbers will be used to find the monitor and telephone scores using the section B table.			
Bagian C			
1.	Mouse 		1 (mouse is at shoulder level) + 2 (mouse/keyboard is on a different surface) + 1 (because the duration exceeds 4 hours in a day)

2.	Keyboard  Wrists Extended/ Keyboard on Positive Angle (>15° Wrist extension) (2)		2 (wrist position raised at an angle >15o) + 1 (keyboard cannot be adjusted) + 1 (duration more than 4 hours)
So, the section C score is the mouse with a score of 4 and the keyboard with a score of 4. These numbers will be used to find the mouse and keyboard scores using the section C table.			

After assessing each worker's body position, scores are calculated in parts A, B, and C until the final score is calculated according to the ROSA form. Based on the final score assessment of all respondents, it is known that as many as 58.33% of respondents have a risk of MSDs in the Warning Level category. As many as 41.67% of respondents have a risk of MSDs in the Necessity of Intervention Measures level category. Workers with work postures that are in the warning level category will be at risk of MSDs if left untreated for a long period. Meanwhile, for workers whose work posture is in the Necessity of Intervention Measures level category, the worker's condition is considered very at risk of experiencing MSDs, and further improvements must be made to the workplace used or the work posture carried out by the worker. This study is in line with research conducted by Tarigan and Zetli, which shows that office workers who use computers tend to experience MSDs risk levels at the warning level. In this study, it was discovered that workers scored five on the final ROSA score, which could cause a person to be at risk of MSDs if left for a long period[7].

The next stage is to identify the cause of the problem to reduce the risks workers face. In general, two factors cause a high risk of MSDs in workers, which are the facility factor and the worker's awareness factor in using facilities ergonomically. Regarding chair height, there are still some chairs whose height cannot be adjusted, especially in the operation sections. This condition causes the worker's legs to form an angle of less than or more than 90^{o}. Apart from that, workers are aware of adjusting the height of the chair, such as workers who choose to position their knees at less than or more than 90^{o} by bending their legs backward or sitting cross-legged on a chair. Furthermore, it is related to the depth of the chair, which cannot be adjusted, causing the distance between the chair and the worker's knees to be too long or too short. Then, regarding the backrests, it was discovered that all workers' backrests could not be adjusted, and the lack of awareness of workers to use the backrests properly caused the workers' backs to be too far back or too forward.

The monitor's position for most workers is good. However, no document holder still aims to increase visibility and accessibility to documents so that they are directly to the left or right of the monitor and at the same height. This condition can improve neck posture problems by eliminating the need to look at documents and support the head in that position for long periods. Most of the mice used are within reach of workers, but many mice and keyboards are still found on different surfaces, and wrists are still positioned at an angle when typing. Then, some workers have a desk height that is too high compared to their body posture, which causes the keyboard to be too high, affecting work comfort.

In order to reduce the risk of MSDs to workers, it is necessary to carry out control efforts in the following ways:

1. Reset the workstation using the following steps:
   a) Providing chairs that can be adjusted in height to chairs that cannot be adjusted in height (adjustable)
   b) Providing chairs whose backrests can be adjusted to a position that suits the worker's back
   c) Provide a base for workers using laptops so that the height of the laptop monitor is at eye level
   d) Improve the layout of work facilities by removing nonwork-related items, clearing the foot area or area under the table, and positioning the mouse parallel to the keyboard
   e) Providing document holders that make it easier for workers to read documents and reduce the risk of neck fatigue
2. Organize a body stretching program for 3 minutes stretching, which can be done every 2 hours.
3. Provide office ergonomics training to office workers so that they know good working posture when working in front of a computer and make maximum use of work facilities.

4. Conclusion

Based on observations that have been made, it is known that as many as seven respondents (58.33%) have a risk of MSDs in the warning level category. As many as five respondents (41.67%) have a risk of MSDs in the Necessity of Intervention Measures level category. Warning-level conditions can cause MSDs if left for a long period. Necessity of intervention measures level conditions are conditions with a high risk of causing MSDs and immediately require work posture improvements. Improvement efforts that can be made include rearranging workstations, creating health information media for stretching and good work posture, and providing ergonomics training for office workers.

Compliance with ethical standards

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Disclosure of Conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

This study meets the criteria of ethics.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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