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Container Crane Operator Ergonomics Analysis PT. X Port Of Tanjung Perak, Surabaya

Eko Mardiyanto[1*], Denny Ardyanto[1], Hari Basuki Notobroto[2]
[1] Faculty of Public Health Master's Degree Program Studies Health and Safety Airlangga University
[2] Faculty of Public Health Department of Biostatistics and Population Airlangga University
Email: eko.mardiyanto2013@gmail.com

Abstract

Container crane operator Jobs the majority was sitting, and bent over to look down. This is always done the operator because of the position of the operator's cabin is located at an altitude of 30-40 meters. The purpose of this research is to analyze the causes of musculoskeletal disorders container crane operator PT. X port of Tanjung Perak, Surabaya.This study reviewed data retrieval is the ways of quantitative research with cross sectional design research. The results showed that the analysis of Anthropometry and body posture with a method operator RULA shows that need further investigation against aspects of ergonomics and posture improvement work required with level 4 score in action. Most of the work stations used by the operator do not comply with Anthropometry operator. The entire container crane has the temperature of the working environment in compliance with threshold values (28-32 ° C). Whole body vibration is still below the threshold. Measurement of hand and arm vibration indicates that exposure to the vibrations of the hands and arms are still below the threshold limit value (TLV). The majority of container crane operator PT. X port of Tanjung Perak Surabaya has complaints of Musculoskeletal Disorders (MSDs) are. The objective of this study was to analyze the relationship between work stations, Anthropometry and Musculoskeletal complaints Disorders cause operator container crane in PT. X port of Tanjung Perak, Surabaya. This type of research is research used descriptive with cross sectional design research. The research was carried out in PT. X port of Tanjung Perak Surabaya, took place in January 2015. The results of the cross-tabulations showed that an operator who has aged less than 40 years, the work of less than 5 and 5-10 years, have a habit of smoking and having a bad work stations have more complaints of Musculoskeletal Disorders (MSDs).

Keywords: Container cranes, work stations, RULA, Musculoskeletal Disorders.

1. Introduction

Container crane is one of the adopted international standard aircraft owned by PT. X port of Tanjung Perak, Surabaya as a means to conduct the activities of loading and unloading crates of above board and on the contrary specific container handling by using gantry crane, container loading and unloading productivity approximately 20 to 25 hours per container. According to Sasiang (2013), such as moving equipment Container crane (CC) and the Rubber Tired Gantry (RTG) is one of the points fatal risk standards, so as to reduce the risks arising from the vehicle and the equipment necessary to move facilities and safe work procedures. The provision of the means and procedure will also provide a secure sense of comfort on workers or operators (Helander Thursday, 2006).

The workplace (work station) that are not ergonomic can cause hazard or health risk (health hazard), for example was not ergonomic seating dimensions or not in accordance with the dimensions of the container crane operator's body then it can lead to poor posture, discomfort, and fatigue (Stranks, 2007). Ergonomic workplace design is a form of adjustment means to man, and when the design work is not in accordance with the principles of ergonomics so workers will need extra exertions to carry out his work (Tarwaka, 2010).

Musculoskeletal complaints are complaints on skeletal muscle that felt someone very complaints ranging from mild to severe (Cohen et al., 1997). If in this case the muscles receive a static load repeatedly and in a long time then it can cause damage to the muscles, nerves, tendons, joints, cartilage and discus intervertebra (Tarwaka, 2004). Musculoskeletal complaints often also named MSDs (Musculoskeletal Disorder), RSI (Repetitive Strain Injuries), CTD (Cumulative Trauma Disorders), Work-related Musculoskeletal Disorders (WMSDs), RMI (Repetitive Motion Injury).

Cohen et al. (1997) mention that MSDs can occur due to factors of work, personal, environmental and psychosocial. Job factors among other awkward postures, static postures, excessive muscle stretching, repetitive

activity, force/load, frequency, duration and tool designers or grips. Worker factor, among others, age, gender, smoking habits, physical freshness, physical strength, body size, the work and the body mass index. Environmental factors, among others, the working climate (temperature), vibration, illumination. Psychosocial factors, among others, job satisfaction, mental stress and organization of work (Bridger, 2003; Tarwaka, 2004).

The Department of health study results in health problems in Indonesia's profile in 2005, showed that about 40.5% of workers suffered illnesses in connection with his work. Health problems experienced by workers, according to research conducted on nurses in 12 districts 9.482 or cities in Indonesia, it is generally a disease of Musculoskeletal Disorders (16%), cardiovascular (8%), nerve disorders (3%) and ENT disorders (1.5%) (Sumiati, 2007).

As a terminal operator, PT. X port of Tanjung Perak, Surabaya has been preparing for three (3) aircraft lifting container crane (CC). CC-1 and CC-2 has a transport capacity of 35.6 tones specification with diesel propulsion motors and built by Mitsubishi Heavy Industries in 1995. CC-03 made by Mitsui Engineering Japan in 1995 with a capacity of 35.5 tons of cargo with diesel motor propulsion (Pelindo III, 2015)

Based on the initial observation, the design of the container crane operator workplace in PT. X port of Tanjung Perak, Surabaya is the original design that has not been changed since installation of container cranes. Operator job when doing his job is sitting on the seat, bent down to see the container, reaching the panel control. The work is done repeatedly for several hours and interspersed with breaks. 20 operators that have long worked (5-15 years) convey that feeling tired and complaints of pain in the back of the head and the back (spine part dorsal, and a cervical lumbosacral) because it works at an altitude of 30-40 meters with a bent posture. Based on explanation above, the authors are interested in conducting research on factors causing Musculoskeletal Disorders complaints container crane operator.

2. Methods

This type of research is descriptive research. Design research is a cross sectional study. The research was carried out in the PT. X port of Tanjung Perak, Surabaya. Research progress in January 2015, with a population of as many as 20 people carrier container crane. Musculoskeletal Complaints variable Disorders (MSDs) is measured with the Nordic method Body (NBM) contained Folders on the questionnaire and in the contents of the container crane operator. The results of the questionnaire and analysis of the injection map Nordic body Body Folder (NBM) then it can be being estimated the type and level of muscular skeletal complaints felt by workers.

Variables of Anthropometry and variable work stations were measured by officials from implementing technical unit safety and occupational health (UPT) K3 and measurements using bows, tape measure and a camera to measure the body container crane operator anthropometry and RULA method to risk posture. Begins with an observation on the job, choose the posture assessed, giving value to posture, to process the value, set the value of RULA then determines the value of the action level.

3. Results

Data on complaints of Musculoskeletal Disorders (MSDs) obtained through the distribution of questionnaires to 20 container crane operator PT. X port of Tanjung Perak, Surabaya.

Table 1. Examination of complaints of Musculoskeletal Disorders Container Crane Operator PT. X port of Tanjung Perak, Surabaya by 2015

Measuring Result	Frequency	Presentation
Low	8	40%
Medium	11	55%
High	1	5%
Total	**20**	**100%**

In the know that the container crane operator of 20 who have complaints of Musculoskeletal Disorders (MSDs) are a number of low-8 persons (40%). Container crane operators who have complaints are a number of 11 people (55%) and who experience high complaints only 1 person (5%).

The process of shooting posture container crane operator workers of PT. X port of Tanjung Perak, Surabaya is done to find out the level of risk the job using the method of RULA. Shooting is done on every carrier container crane operator's work station and container cranes. On every process carried out shooting more than once to

obtain pictures that can illustrate the working conditions at the time. Presented in attachment one of the images and the result RULA method scoring. After the final score is obtained, which is worth 1 to 7 indicate the level of actions (action level) at number 4 on the action level 2, meaning that further investigation was needed and it may just be a change is needed.

Table 2. Cross-tabulate work stations with complaints of Musculoskeletal Disorders Container Crane Operator PT. X port of Tanjung Perak, Surabaya 2015

Work Station	MSDS Level						Total	
	Low		Medium		High			
	(f)	(%)	(f)	(%)	(f)	(%)	(f)	(%)
Does not comply	6	40,00	8	53,30	1	6,70	15	100,00
In accordance	2	40,00	3	60,00	0	0,00	5	100,00
Total	**8**	**40,00**	**11**	**55,00**	**1**	**5,00**	**20**	**100,00**
Coeficience Contingency = 0,134								

With work stations that do not fit the operator experienced Musculoskeletal Disorders complaints with low complaint rates a number of 6 operators (40%), low level of complaints of a number of 8 operators (53,3%), and the high number of complaints level 1 operators (6.7 percent). Operators who have a work station according to the operators, there were complaints of Musculoskeletal Disorders, namely, the low number of complaints level 2 operators (40%) and the rate of complaints was an amount of 3 operators (60%). Based on the table above are known to a large contingency coefficient of 0,134 which means that the strength of the relationship work stations respondents with Musculoskeletal Disorders (MSDs) of 0.02. Incidence of Musculoskeletal Disorders (MSDs) is influenced by work station 2% of respondents.

4. Discussion

4.1 MSDS Complaint

A muscular skeletal complaint generally occurs due to excessive muscle contractions caused by the granting of a too heavy workload with the imposition of long duration. Instead, the complaint is not likely to occur if muscle contractions only ranges between 15-20% of maximum muscle strength. But when muscle contraction exceeds 20%, then the blood circulation to the muscles is reduced according to the degree of contraction that is affected by the amount of effort required. The supply of oxygen to the muscles decreases, the process of carbohydrate metabolism and hampered as a result of lactic acid build-up occurs which causes the onset of muscle soreness.

Based on the results of the Nordic questionnaire filling body folder (NBM) Container crane operator by 20 PT. X port of Tanjung Perak, Surabaya, the majority (55%) of the operator having a complaint are MSDs. Studied by Bedu et al. (2013), stating that the complaint related to Musculoskeletal Disorders work-worker stance is not ergonomic. The perceived complaint the operators is often musculoskeletal complaints were complained by the operator. It is also delivered by the Saputra et al. (2013) stating that an operator who works with a long sitting work attitude is largely subjected to complaints of pain.

4.2 Work Station

Work stations that do not comply with the conditions of workers physical can cause discomfort that may decrease the effectiveness and efficiency of the work. If the size of the work stations is not adapted to the size and the physical state of the workers then a period of time can lead to stress the body. The body's stress, among others, can be uncomfortable, tired, pain, dizziness and others (Santosa, 2004). The feeling of pain, pain, tingling, stiffness and excessive fatigue is a symptom of Musculoskeletal Disorders (MSDs) (Hidayat et al., 2013).

The results showed that complaints of Musculoskeletal Disorders (MSDs) are the majority of experienced by workers who have work stations which are not in accordance with the operator's body. Research by Hidayat et al. (2013) States that workers who work with ergonomic work position (awkward position) will experience a complaints of pain in specific parts of the body. This is in accordance with the results of research, where the operator works with inappropriate work stations and mayoritas of operators experienced a Musculoskeletal complaint Disorders (MSDs).

5. Conclusion

Based on the results of data analysis conclusions can be obtained as follows:

1. The majority of container crane operator PT. X port of Tanjung Perak, Surabaya experienced musculoskeletal complaints were Disorders (MSDs).
2. Complaints of Musculoskeletal Disorders (MSDs) are the majority of experienced by workers who have work stations which are not in accordance with the operator's body

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