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Work Posture and Musculoskeletal Disorders of Tempe Craftsmen in Sanan Tempe Industrial Center, Malang East Java, Indonesia

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ABSTRACT

Musculoskeletal disorders is an uncomfot symptom in the muscles and bones area. It start from very mild to very severe and often due to repeatedly heavy burden that received for long period. Musculoskeletal disorders in workers become an important problem because it can cause lost work time, decrease in work productivity, decrease alertness, increase the risk of accidents, and high handling costs. In tempe industry, soybeen usually washed in manual procedure and this process often causes pain in the waist, spine, and both hands of the workers. Manual soybean washing can cause working accidents and work-related illnesses. Manual soybean washing are involving muscles and bones that have damage potency to the spine. The purpose of this study was to analyze the relationship between work posture and musculoskeletal disorders in Sanan Tempe Industrial Center, Malang. This study research design was an observational analytic with a cross sectional approach. Based on this study it can be concluded that there is a relationship between work posture and musculoskeletal disorders. The industry should organize training that gain an information and action to reduce the harm potential of wrong work postures on tempe craftsmen.

Keywords: Musculoskeletal disorders, Tempe craftsmen, Work posture

INTRODUCTION

Background

Industry is one fields that has great potency in national development because this industry need many labor and be able to reduce employement. However, in carrying out most of its production activities, home industries still rely heavily on human labor. Some work procedures are carried out manually with possibility wrong work posture for a long duration. This can cause unsafe conditions⁽¹⁾. Manual handling is one of the factor it hat cause muscle injuries by inappropriate work postures. Inappropriate work posture causes the position of body parts go away from the normal position. The further work posture from body gravity, will give higher risk of musculoskeletal disorders⁽²⁾. Musculoskeletal disorders are complaints of muscle and bone in workers ranging from very mild to very severe complaints due to the burden received repeatedly in a long time⁽³⁾. Musculoskeletal disorders become an important problem because can cause lost work time, decrease work productivity, decrease alertness, increase the risk of accidents, and high handling costs.

Indonesia is the world's largest producer of tempe and the largest soybean market in Asia. As a dietary food, tempe is one of the basic foods needed by the body⁽⁴⁾. Sanan Tempe Industrial Center Malang is a tempe industry that produce tempe whiches used as a souvenir of Malang City⁽⁵⁾. This industrial center is the center of the tempe industry in Malang City because almost all residents in Kampung Sanan work as tempe producers. The large number of tempe craftsmen in Sanan village, makes the industrial climate conducive to more able to advance the business in the hope that this business can meet the needs of consumers⁽⁶⁾.

Based on data from the Cisadea Health Medical Center Malang in June 2018 there were 228 tempe craftsmen who reported suffering from musculoskeletal disorders and 42% of 228 craftsmen with musculoskeletal symptom were employee in the soybean washing section. In the tempe industry, there is

procedure of soybean washing that is done manually. In this process workers do work in a bent and standing position. These activities have a high risk and cause pain in the waist, spine, and both hands. The manual handling work, requires workers to have more muscle and bone abilities. Soybean washing on tempe producing can cause work accidents and work-related diseases because their activities involve muscles and bones that have the potential to cause damage to the spine⁽⁷⁾.

Purpose

The purpose of this study was to analyze the relationship between work posture and musculoskeletal disorders of Tempe Craftsmen in Sanan Tempe Industrial Center, Malang.

METHODS

The research used in this study was an observational analytic design with a cross sectional approach. This research was carried out in the Sanan Tempe Industrial Center, Malang in January-February 2019. The samples were all tempe craftsmen in the soybean washing section at the Sanan Tempe Industrial Center, Malang, which were 115 respondents. The data collection instrument used in this study is Rapid Entire Body Assessment (REBA) to measure work posture and Nordic Body Map to measure musculoskeletal disorders. Statistical tests were used to analyze the relationship between work posture and musculoskeletal disorders using the spearman rank test.

RESULTS

Individual Characteristics to Tempe Craftsmen in Sanan Tempe Industrial Center, Malang

We grouping 115 tempe craftsmen in Sanan Tempe Industrial Center, Malang based on age and gender. The instrument for data collection was a questionnaires. Based on the obtained data, we can presented the individual characteristics of the respondent in table 1.

Table 1. Distribution of individual characteristics based on age and gender

Individual characteristics	Total	
	Frequency	Percentage
Age	<30 years old	27 23.4
	>30 years old	88 76.6
	Total	115 100
Gender	Male	72 62.6
	Female	43 37.4
	Total	115 100

Table 1 showed that 72 respondents (62.2%) were male and 88 respondents (76.6%) age were >30 years old.

Work Posture to Tempe Craftsmen in Sanan Tempe Industrial Center, Malang

Table 2. Distribution of work posture

Work posture	Frequency	Percentage
Low risk	14	12.2
Moderate	76	66.1
High risk	25	21.7
Total	115	100

Based on Rapid Entire Body Assesment (REBA)

Tabel 2 showed that moderate risk was the majority level risk that threatening by tempe craftsmen in Sanan Tempe Industrial Center, Malang caused by their work posture. It shown that 76 respondent (66.1%) have moderate risk.

Musculoskeletal Disorders to Tempe Craftsmen in Sanan Tempe Industrial Center, Malang

Table 3. Distribution of Musculoskeletal Disorders

Musculoskeletal Disorders	Frequency	Percentage
Low symptom	67	58.3
Moderate symptom	48	41.7
Total	115	100

Based on Nordic Body Map (NBM)

Table 3 showed that musculoskeletal disorders to majority of tempe craftmen or 67 respondent (58,3%) in Sanan Tempe Industrial Center, Malang, is categorize as low symptom musculoskeletal disorders.

Correlation between Work Posture and Musculoskeletal Disorders to Tempe Craftsmen in Sanan Tempe Industrial Center, Malang

Table 4. Correlation between work posture and musculoskeletal disorders

Work Posture	Musculoskeletal Disorders				Total		p-value
	Low Symptom		Moderate Symptom				
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Low Risk	1	7.1	13	92.9	14	12.2	0.033
Moderate Risk	64	84.2	12	15.8	76	66.1	
High Risk	2	8.0	23	92.0	25	21.7	

The results of data analysis from Table 4 showed that there is a correlation between work posture and musculoskeletal disorders due to the p-value = 0.033.

DISCUSSION

Majority, soybean washing workers in the Sanan Tempe Industrial Center, Malang, were over 30 years old. Age is defined as the length of a person's existence when its measured in units of time, in terms of chronological, normal individuals who exhibit the same degree of anatomical and physiological development⁽⁸⁾. Young individuals generally do not have a large responsibility as breadwinners. While individuals in the age group more than 30 years are generally required to make a living. Therefore, the majority of soybean washers in the Sanan Tempe Industrial Center, Malang, are over 30 years old. Gender grouping showed that the majority of respondents were male gender is the physiological and anatomical attributes that distinguish between men and women⁽⁹⁾. Men have a role to become heads of families. Traditionally, the task of the head of the family is to meet the economic needs of the family⁽¹⁰⁾. This fact underlies the result study that the majority of soybean washers in the Sanan Tempe Industrial Center, Malang, are male.

This study was also found that the majority of respondents had a moderate risk work posture, specially the work posture during soybean washing activities. Body position that is not appropriate can cause injury to muscles and bones. Work posture is the body's position that require moving position away from its natural position. This inappropriate work posture is generally caused by the demands of work, work tools, and work stations not in accordance with the abilities and limitations of workers. Working should be done in a good body position such as sitting position with the neck not bent or imposing a posture according to the work done⁽¹¹⁾. In addition, good work postures still could be risky if the working hour is held for long periods of time⁽¹²⁾.

Based on the results of the study, the majority of respondents experienced minor symptom. They complain about pain in parts of the body specially on the shoulder and back. Other studies suggest that musculoskeletal disorders are mostly felt in the shoulder as much as 60%, neck as much as 69%, and back as much as 77%⁽¹³⁾. Shoulder musculoskeletal disorders commonly occurred because workers do repetitive work where the position of the shoulder in a state of holding heavy loads or when the shoulder position is not right while working. Back musculoskeletal disorders often arise due to the work posture bending so then force the

muscles and spine to swell. The bending position sometimes occurs because the position of the working media is lower than the body⁽¹⁴⁾.

Based on the results of an analysis of the relationship between work posture and musculoskeletal disorders in tempe craftsmen, that do soybean washing manually in the Sanan Tempe Industrial Center, Malang, was showed that there is a relationship between work posture and musculoskeletal disorders. In the tempe industry, the soybean washing process still done manually. These activities have a high risk and cause pain symptom in the bones and muscles. Manual handling activity requires workers to have more muscle and bone abilities and strength. Soybean washing while produce tempe that manually carry on, can cause work accidents and work-related diseases because their activities involve muscles and bones which corellated with spine damage potency⁽⁷⁾. Similar study have shown that there were 80.0% of respondents experiencing musculoskeletal disorders, and the analysis indicate there was an association between work posture and musculoskeletal disorders in tofu factory workers⁽¹⁵⁾.

CONCLUSION

This study have conclude that there was a relationship between work posture and musculoskeletal disorders to tempe craftsmen in Sanan Tempe Industrial Center, Malang.

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