



Research Article

# Evaluation of Potential Ergonomic Hazards Using the SNI 9011:2021 Method for Labeling Unit Workers in One of the East Java Agro-Industrial Company

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## ABSTRACT

The industry's lack of attention to the implementation of ergonomics can give rise to complaints of Occupational Skeletal Muscle Disorders (GOTRAK) in workers. This research aims to evaluate the potential ergonomic hazards of labeling unit workers in one of the East Java Agro-industrial companies. This research is quantitative with a descriptive approach. The population of this study were labeling unit workers in one of the East Java Agro-industrial companies using a sampling technique, namely saturated sampling, totaling 21 respondents. The data collection technique was carried out using the SNI 9011:2021 method. The results of the GOTRAK complaint risk level study show that there are 6 parts of the skeletal muscles that have a high risk, namely the upper back muscles (47.6%), lower back (42.9%), left and right hands (28.6%), left hip and right (33.3%) and left knee (28.6%), and right knee (23.8%). The research results on potential ergonomic hazards stated that all respondents (100%) had a total potential ergonomic hazard score  $\geq 7$ , including the dangerous category.

**Keywords:** Ergonomics, GOTRAK, SNI 9011:2021

## INTRODUCTION

Workers' lack of knowledge regarding the potential and risks of ergonomic hazards that can occur in the workplace causes workers to ignore safety factors often when working and prioritize comfort, even though comfort is not necessarily safe for the health and safety of workers (Ayu et al., 2020). According to Anggun et al., (2022), One of the risks is the lack of attention to the application of ergonomics in Musculoskeletal Disorders (MSDs). Complaint musculoskeletal or work-related skeletal muscle disorders are damage to muscles, nerves, tendons, ligaments, joints, cartilage, and discus invertebrates.

Data from the Bureau of Labour Statistics (BLS) in 2014 stated that all workers in America had 365,580 cases of MSDs. According to a study from the Labour Force Survey (LFS) on Self-reported work-related ill health and workplace injuries (2015), the prevalence of work-related MSDs in the U.K. is 533,000. In Indonesia, the prevalence of MSDs based on data from the Ministry of Health's Basic Health Research Report in 2018 was 7.3%, and East Java contributed 6.72% to the prevalence of joint disease (Kemenkes RI, 2019).



Event-related factors Musculoskeletal Disorders (MSDs) for workers is a work factor, namely unnatural work attitudes (Hutabarat, 2017). Other factors related to incident Musculoskeletal Disorders (MSDs) in workers are work factors, namely sitting for long periods and in static conditions (Ayu et al., 2020).

One of the agro-industrial companies in East Java is a subsidiary of Indonesia's largest and most comprehensive fertilizer company. In the production process not all production processes in this company use automatic machines. There are still several production processes that are still carried out manually using human power. One of them is the labeling process or placing labels on product packaging. The labeling process is carried out continuously for 8 hours daily, producing around 4000-5000 packages for one worker.

Results of an initial survey conducted at one of the East Java agro-industrial companies in February 2023 Workers in the Labeling Unit carry out their work in a working attitude, namely sitting on the floor using a cardboard mat, with a bent position and legs bent. Workers in the Labeling Unit are not provided with a workplace in the form of chairs or work desks, so workers often complain of pain in parts of the body, especially the back and other parts. By looking at the existing conditions, the researcher assumes that the conditions of work attitudes in one of the East Java Agro-industrial companies in Labeling Unit need to be more ergonomic. Therefore, researchers want to conduct research titled "Evaluation of Potential Ergonomic Hazards Using the SNI 9011:2021 Method for Labeling Unit Workers in an East Java Agro-Industry Company".

## MATERIAL AND METHODS

This research is a quantitative descriptive research with an observational approach. This research was conducted at one of the East Java Agro-industry companies in March 2023. The population in this study were workers in the Labeling Unit at one of the East Java Agro-industrial companies using a sampling technique, namely saturated sampling, totaling 21 respondents. The type of data used in this research is primary data obtained from observations of the checklist for potential dangers of ergonomic factors and the GOTRAK complaint survey questionnaire based on SNI 9011:2021.

## RESULTS AND DISCUSSION

### Complaints of Work-related Skeletal Muscle Disorders (GOTRAK)

Respondent data based on the level of risk of complaints of skeletal muscle disorders were obtained from the results of completing a survey questionnaire for work-related skeletal muscle disorders (GOTRAK). Respondents were asked to respond to the parts of the body that often experience complaints of pain/pain during or after doing work. The results of this study are as follows:

**Table 1. GOTRAK Complaint Risk Level Frequency Distribution**

		Risk Level						N	%
		Low Risk		Moderate Risk		High Risk			
		n	%	n	%	n	%		
Part	Neck	18	85,7	2	9,5	1	4,8	21	100
Muscles Order	Right Shoulder	14	66,7	4	19,0	3	14,3	21	100
	Left Shoulder	14	66,7	4	19,0	3	14,3	21	100
	Right Elbow	19	90,5	0	0	2	9,5	21	100
	Left Elbow	18	85,7	0	0	3	14,3	21	100
	Upper Back	6	28,6	5	23,8	10	47,6	21	100

		Risk Level						N	%
		Low Risk		Moderate Risk		High Risk			
		n	%	n	%	n	%		
	Lower Back	8	38,1	4	19,0	9	42,9	21	100
	Right Arm	18	85,7	1	4,8	2	9,5	21	100
	Left Arm	18	85,7	1	4,8	2	9,5	21	100
	Right Hand	14	66,7	1	4,8	6	28,6	21	100
	Left Hand	14	66,7	1	4,8	6	28,6	21	100
	Right Hip	11	52,4	3	14,3	7	33,3	21	100
	Left Hip	11	52,4	3	14,3	7	33,3	21	100
Part	Right Thigh	17	81,0	3	14,3	1	4,8	21	100
Muscles	Left Thigh	17	81,0	3	14,3	1	4,8	21	100
Order	Right Knee	14	66,7	2	9,5	5	23,8	21	100
	Left Knee	13	61,9	2	9,5	6	28,6	21	100
	Right calf	17	81,0	2	9,5	2	9,5	21	100
	Left Calf	17	81,0	2	9,5	2	9,5	21	100
	Right Leg	15	71,4	1	4,8	5	23,8	21	100
	Left Leg	15	71,4	1	4,8	5	23,8	21	100

Table 1 shows that most respondents' skeletal muscles are low-risk. However, there are six parts of the skeletal muscles that have a high risk, namely in complaints of disorders of the upper back skeletal muscles in as many as 10 people with a percentage (47.6%), skeletal muscles in the lower back of the lower back as many as 9 people with a percentage (42.9%), left and right-hand skeletal muscles as many as 6 people with a percentage (28.6%), left and right hip skeletal muscles as many as 7 people with a percentage (33.3%) and left knee skeletal muscles as many as 6 people with a percentage (28.6%) and the skeletal muscles of the right knee as many as 5 people with a percentage (23.8%).

From the research results, complaints of skeletal muscles in the upper and lower back are caused by a bent position and no backrest available when doing work, causing pain. Complaints of the skeletal muscles in the hands are caused by repetitive work. When carrying out labeling activities, there are fast hand movements, and the position of the hands is not supported, which increases the pain in the hands during and after work. Complaints of the skeletal muscles of the hips are caused by working position in a sitting position for a long time and in static conditions that burdens the muscles of the hips and there is tension in the muscles in the area, which results in pain. Complaints of the skeletal muscles in the knee are caused by the position of the worker's feet when doing work with the legs bent for a long time, resulting in a feeling of tingling and pain in the knee area.

According to Krismayani and Muliawan (2021), When the back is in the wrong position, such as bending, the spine will move to the front of the body so that the back muscles will contract. The muscles in the abdomen and front side of the body undergo movement and flexion, which will cause pain in the back and surrounding areas. The muscles in the back will also work hard to support the weight of the upper limbs doing their work. This activity causes the workload to rest on the lumbar region. It causes the lumbar muscles, as the primary load bearer, to easily experience pain in the muscles around the lower back and will spread to other parts of the body.

Work done by sitting or squatting and bending causes pain in the back (Felia, 2022). According to the theory coined by the European Agency for Safety and Health at Work (2019), A static sitting work position will increase ligament tension and can place a higher burden on muscles and tendons. This position causes an increased risk of pain and soft tissue injury, namely muscles,

tendons and ligaments because when work is done in a sitting position for a long time, the body position of the shoulders tends to bend. The head is forward, causing chest muscles to tighten and upper back muscles to weaken. Musculoskeletal health effects associated with prolonged static sitting are lower back pain and shoulder-neck complaints.

**Ergonomics Potential Hazard Data**

The respondent's data is based on the potential hazards of the ergonomics factor obtained from the results of observations directly related to the respondent's working position, whether there are awkward postures, then determines the duration of exposure to the awkward postures to the respondent and assesses the score of each potential hazard using the checklist instrument for potential hazards of ergonomics factors in SNI 9011: 2021. The sum of the values for each potential hazard if it has a value of  $\leq 2$  then the working conditions can be said to be safe; if the value is 3-6 then the workplace is said to need further observation, and if the value is  $\geq 7$  then the workplace is said to be dangerous. The results of this study are as follows:

**Table 2. Frequency Distribution of Hazard Potential Ergonomic Faktor**

No	Score	Category	Frequency (n)	percentage (%)
1.	$\leq 2$	Safe Workplace Condition	0	0
2.	3-6	Need Further Observation	0	0
3.	$\geq 7$	Dangerous	21	100
Amount			21	100

Table 2 shows that all respondents, as many as 21 people with a percentage (100%), have a potential hazard factor ergonomics value  $\geq 7$ , so it can be interpreted that the potential hazard factor for ergonomics workers at the Labeling Unit at one of the East Java Agro-Industry Company is included in the dangerous category.

The research results obtained from a checklist of potential hazards for ergonomics factors include exposure to potential hazards for workers, namely in the position of the neck that bends while working, the position of the arms and elbows that are not supported, there is a rapid rotation of the forearm, the wrist bends forward, the movement of the arm that moves stably with regular pauses, a sitting position for a long time without a backrest or back support and adequate footrests. There are also environmental factors, namely insufficient lighting and too high temperatures. The percentage of exposure time to the potential hazard is around 12.5% -100%. This result is because almost all workers' total working hours are exposed to these potential hazards, so the total value of the potential hazard factor for worker ergonomics in an East Java Agro-Industry Company Labeling Unit is 13-17. Based on SNI 9011: 2021, this value is included in the dangerous category because it is more than 7, so it is necessary to evaluate the labeling process to make workers feel more comfortable and safe when doing work (SNI 9011:2021).

**CONCLUSION AND SUGGESTION**

Based on the results of research on the level of risk of Occupational Skeletal Muscle Disorders (GOTRAK) complaints, it shows that six parts of the skeletal muscles have a high risk, namely the upper back muscles, lower back skeletal muscles, left and right-hand skeletal muscles,

skeletal muscles, the left and right hips, the skeletal muscles of the left knee, and the skeletal muscles of the knee. Apart from that, the results of the potential hazards of ergonomic factors also showed that all respondents had potential ergonomic hazards, which had a total score of  $\geq 7$ , so the workplace could be considered dangerous.

It is recommended that companies carry out ergonomic risk assessments for all workers regularly and periodically, provide training to workers related to the principles of ergonomics in the workplace and work procedures following ergonomic aspects, and provide socialization and knowledge to all workers regarding the importance of OHS, primarily related to ergonomics, so that workers do not ignore ergonomic factors in doing work. Employees need to provide administrative control by putting up posters about the importance of ergonomic implementation. Apart from that, it is hoped that the company can provide technical control by providing workstations that comply with ergonomic aspects to avoid awkward postures, and the company management will screen workers' body size when recruiting new workers so that worker candidates whose body size does not match the size of the available workstations can be reconsidered.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this research.

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