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Relationship of work position with complaints of musculoskeletal disorders (MSDs) in cracker industrial worker at Kedungdoro village, Sidoarjo

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Abstract. Musculoskeletal complaints are the most frequently reported complaints to workers. Cracker industry workers in Kedungrejo Village, Sidoarjo sit for more than 6 hours doing repetitive movements which are at risk of developing complaints of Musculoskeletal Disorders (MSDs). The aims of this research was to analyze the relationship between work position with complaints of MSDs in cracker industry workers in Kedungrejo village, Sidoarjo. The type of this research is an analytical survey with a cross-sectional study. The research population was all cracker industry workers at village Kedungrejo. The research sample of 46 respondents was taken by simple random sampling technique. Data related to respondent characteristics like work position and MSDs complaint obtained from direct observation to the field with using Rapid Upper Limb Assessment (RULA) assessment and interviews with workers using Nordic Body Map (NBM). Data analysis using SPSS with statistical test rank spearmen. Statistical test results showed that almost half of the respondents (43.5%) had complaints of MSDs at a very high level and most (60.9%) had work position with a low risk category. The results showed that there was a significant relationship between work position and MSDs complaints in cracker industry workers with a value of $0.033 < 0.05$ in the test rank spearmen. The strength of the relationship between variables is seen from the correlation coefficient with a result of 0.315 which means weak. The direction of correlation is positive, which means that poor work position can increase MSDs complaints. The conclusion is research that there is a significant relationship between work attitudes and MSDs complaints in cracker industry workers. Suggestions for the cracker industry to replace workers' chairs with ergonomic chairs and for cracker industry workers to stretch before working and consuming water on the sidelines of work.

1. Introduction

Occupational diseases can occur when doing work activities. Statistics data in *The Health and Safety Executive* (HSE) 2010 explained that the results of a survey of three hundred office workers in the 2007-2009 period showed that musculoskeletal disorders were the most widely reported disease, 53% [3].

The disorder of the musculoskeletal system is a major cause of absenteeism work for a worker, which raises considerable costs for the public health system. Disorders of certain musculoskeletal systems relate to different parts of the body according to the type of work. The severity of disorder this can vary between occasional or pain for certain diseases such as the diagnosis. The occurrence of pain caused by *overloading* acute *reversible* or perhaps the initial symptoms for serious illness (Ministry of Health of the Republic of Indonesia, 2010).

According to *Self-reported Work-related Illness* (SWI) in the UK in 2009/2010, it was informed that diseases and injuries in the industrial sector in Great Britain estimated the manufacturing industry



prevalence rate of 3440 / 100,000 cases. With cases of *Musculoskeletal Disorders* (MSDs) of 1250-1830 per 100,000 workers per year (*The Health and Safety Executive, HSE, 2010*). The results of the Center for Health Study Laboratory studies ITB and Ergonomics in 2006-2007, data obtained that as many as 40-80% of workers reported complaints at the musculoskeletal after work (Ministry of Health of the Republic of Indonesia, 2010).

The cracker industry in Kedungrejo Village, Jabon District, Sidoarjo Regency is one of the village's superior potentials. At present there are 8 cracker industries in Village Kedungrejo that are active in the production of crackers traditional every day. Workers cracker industry start work from 2 am in a long sitting position with repeated movements. This can increase the risk of workers experiencing complaints of *Musculoskeletal Disorders* (MSDs). The results of the initial survey conducted on cracker industry workers in Village Kedungrejo in the assessment sheet *Nordic Body Map* showed that most workers complained of neck pain, shoulder pain, disturbances sleep, and tingling. Workers consider complaints that are felt as a result of working.

2. Method

Type of research is an analytical survey with a cross sectional design. The population was study all industry workers cracker in Kedungrejo Village, Sidoarjo. The research sample taken in July 2019 was 46 respondents taken by *simple random sampling technique*. Using the sheet assessment *Nordic Body Map* (NBM) and *Rapid Upper Limb Assessment* (RULA). Data analysis using SPSS with statistical *rank Spearman* test and correlation test using *correlation coefficient*.

3. Result and Discussion

3.1. Results

Table 1. Characteristics of respondents workers in cracker industrial workers at Kedungrejo village, Sidoarjo.

Charasteristics	Category	n	%
Age	17-25 years	3	6,5
	26-35 years	9	19,6
	36-45 years	10	21,7
	46-55 years	15	32,6
	56-65 years	8	17,4
	>65 years	1	2,2
Sex	Man	7	15,2
	Woman	39	84,8
Educational Background	Elementery School	32	69,6
	Junior High School	4	8,7
	Senior High School	2	4,3
Time Periode	>8 hour	10	21,7
	6-8 hour	36	78,3
Working Periode	>5 years	19	41,3
	≤ 5 years	27	58,7
Complaint of MSDs	Low	2	4,3
	Middle	5	10,9
	High	19	41,3
	Very High	20	43,5
Work Position	No risk	2	4,3
	Risky	5	10,9
	Low Risk	28	60,9
	High Risk	11	23,9
	Total	46	100,0

(Source: Primary Data, 2019)

Table 1 showed the distribution of characteristics of respondents in industry workers cracker in Kedungrejo Village, Jabon District, Sidoarjo Regency. From 46 workers as respondents, most worker above 40 years old 24 workers (52.2%), and only 3 workers (6.5%) less than 25 years old. The respondents were mostly female with 39 people (84.8%) with the dominance of elementary school education as many as 32 people (69.6%). Respondents have a time periode 6-8 hours per day as many as 36 people (78.3%) with a working period dominated 5 years as many as 27 people (58.7%). Information was obtained that most of worker, working with low risk category of 28 people (60.9%) with complaints of *Musculoskeletal Disorders* (MSDs) at a very high level of 20 people (43.5%).

Table 2. Cross tabulation of work position with complaints of Musculoskeletal Disorders (MSDs) in cracker industrial workers at Kedungrejo village, Sidoarjo.

No.	Work Position	Category Complaint of <i>Musculoskeletal</i>								Total	
		Low		Middle		High		Very High		n	%
		n	%	n	%	n	%	n	%		
1.	No risk	2	100,0	0	0	0	0	0	0	2	100,0
2.	Risky	0	0	0	0	4	80,0	1	20,0	5	100,0
3.	Low Risk	0	0	5	17,9	11	39,3	12	42,9	28	100,0
4.	High Risk	0	0	0	0	5	45,5	6	54,5	11	100,0
Total		2	4,3	5	10,9	20	43,5	19	41,3	46	100,0
Statistic Test Rank Spearman						Sig (2-Tailed 0,033)					
Correlation Coefficient						0,315					

(Source: Primary Data, 2019)

Table 2 showed statistical test of the relationship between attitudes work and complaints of *Musculoskeletal Disorders* (MSDs) in Cracker Industrial Workers at Kedungrejo Village, Sidoarjo using the rank test Spearman obtained sig (2-tailed) value of 0.033 < 0.05. These results can be concluded that there is a significant relationship between work position with complaints of *Musculoskeletal Disorders* (MSDs) in Cracker Industrial Workers at Kedungrejo Village, Sidoarjo. The strength of the relationship between variables is seen from the *correlation coefficient*. The strength of the relationship between variables is seen from the *correlation coefficient* with a result of 0.315 which means weak. The direction of correlation is positive, which means that poor work position can increase MSDs complaints.

3.2. Discussion

The cracker industry in Kedungrejo Village is still done manually from the making of cracker dough, the process of making half-baked dough, drying which relies on sunlight until the packaging process. To start making crackers starting from 2 in the morning until the drying process at 9 in the morning. Process make cracker to packing need 8-12 hours/day. In the process of making dough flour the cracker industry workers work in a hot room with repetitive movements to take the flour mixture which is still liquid and placed in a baking sheet and then steamed over boiling water.

The room with minimal ventilation makes the condition of the room feel hot plus the smoke from the water in the pan which is intended to steam the flour mixture to make the work atmosphere uncomfortable. The cracker industry workers must also finish the flour mixture into half-cooked crackers before 7am for drying. If it is not finished at 7 it will cause a delay in the drying process, then at 08.00-15.00 for the drying process under the sun. The results of the study found that most worker had working with low risk work position as many as 28 people (60.9%). This means that the work position of cracker industry workers in Village Kedungrejo needs to be examined and repairs must be made immediately. Workers work in long sitting positions on non-ergonomic chairs, where the height of the chair is not adjusted to the height of the worker.

In addition, repetitive movements are carried out when taking the dough and pouring the mixture into a baking sheet to put the sheet to half-cooked cracker place the position of the worker rotates the upper body 90° - 180° . A slightly slumped sitting position can make the soft tissues of the spine between the anterior and posterior compressed causing pain. Besides the static position, a slight movement makes the muscles and joints static load. In this condition the blood supply that carries nutrients and oxygen will be disrupted so that it will disrupt the body's metabolic processes and stress or pressure on certain parts of the body [14].

Influence by poor workplace design Non-seating ergonomic where the size of the seat height does not match the body posture. This can increase the risk of having complaints *Musculoskeletal Disorders* (MSDs) so that workplace repairs are needed. Extreme body positions will increase pressure on muscles, tendons, and nerves [17].

The results of this research showed almost half had complaints of *Musculoskeletal Disorders* (MSDs) at a very high level of 20 people (43.5%). The complaint does not appear suddenly but a collection injuries of past and left industry workers Cracker can work more than 12 hours / day by doing repetitive movements and non-ergonomic positions. The risk can be happen to cracker industry workers is *Musculoskeletal Disorders* (MSDs). This is happen because all workers at crackers industry sit for a long time and always doing repetitive movements with not ergonomic seating with a type of chair Non-plastic or wooden without backrest and without a hand holder and all the condition will make workers feel pain in the neck and back of the head. Static sitting positions and long periods of time can often result in stiff posture and static muscle loads.

The results of cross tabulation indicate that there is a relationship between work position with complaints of *Musculoskeletal Disorders* (MSDs). This is due to factors of work equipment that are not suitable so that it affects the work position of workers which then also affects musculoskeletal complaints. Tarwaka (2010), states that in general the complaints of skeletal muscles begin to be felt in working age, namely the age of 25-65 years. The first complaint is usually felt at the age of 35 years and the level of complaints will continue to increase with age. This happens because at middle age, muscle strength and endurance begin to decline so the risk of muscle complaints increases. From the results of the study, it was found that the characteristics of respondents based on age were almost half, namely workers aged 46-55 years as many as 15 people (32.6%). Based on research data, almost all workers experience musculoskeletal complaints.

The results of the analysis show that work attitudes are weakly correlated with complaints of *Musculoskeletal Disorders* (MSDs), which can occur because each respondent has a different work attitude even though the work done is relatively the same. When making half-baked crackers, the respondent uses a lot of hand strength, so the risk of having complaints about the wrist risk and also the hand muscles is. This has the potential to result in complaints of *Musculoskeletal Disorders* (MSDs). This is supported by research conducted by Nurjanah (2012), that repetitive work relates to wrists and palms as work activities cyclic repetitive such as grasping hands or wrists extension and flexi, radial aberrations, and supination or pronation [7].

4. Conclusion

The conclusion from this research, there is a significant relationship between work position with complaint of *Musculoskeletal Disorders* (MSDs) at cracker industrial workers at Kedungrejo Village, Sidoarjo, this happens because workers work around 6-8 hours in the same work position by using a chair that is not ergonomic. Suggestion for the cracker industry owner are to replace worker's chair with ergonomic, or give a cushion to the chair to work comfortably and for the workers should do stretching before working and consuming more water while working.

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