

## Risk Factors of Musculoskeletal Disorders (MSDs) Among Production Workers in Bandung City, Indonesia

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### ABSTRACT

**Background:** The prevalence of musculoskeletal disorders in Indonesia in 2020 based on diagnoses made by health workers is 11.9% and based on diagnosis or symptoms is 24.7%. The results of a preliminary study of 5 workers using a Nordic Body Map (NBM) questionnaire showed that 100% of workers experienced MSDs complaints. The purpose of this study was to determine various factors associated with complaints of musculoskeletal disorders (MSDs) among workers in the production division of PT. X in Bandung City.

**Methods:** This study is a quantitative research with a cross-sectional design. There were 64 workers selected as sample, using a simple random sampling technique. The research instrument utilized a Nordic body map questionnaire. Chi-square was used as a bivariate test.

**Results:** There is a relationship between age and MSDs complaints (p-value = 0.000), years of service (p-value = 0.000), and work posture (p-value = 0.042). There is no relationship between smoking habits (p-value = 0.157), and body mass index (p-value = 0.169) with complaints of MSDs.

**Conclusion:** This study concluded that there is a relationship between age, years of service, and work posture with complaints of MSDs. There is no relationship between smoking habits and body mass index with MSDs complaints. Preventive measures should be promoted among the factors workers to reduce the risk of musculoskeletal disorders. Hence, workers should be given time to stretch for  $\pm$  5 minutes at rest to relax the muscles again.

**KEYWORDS:** Occupational health, risk factors, work posture

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### 1. INTRODUCTION

The production process in formal and informal industrial activities on a large or limited scale is often accompanied by some factors that have a risk of danger so that work accidents and work-related illnesses can occur accordingly.<sup>1</sup> One of the risks that can arise includes ergonomics. Ergonomics issues have a very important influence on the industrial sector. Now many industries are using machines in their work processes because using machines can make human work easier so that it is more efficient at completion time and also reduces the risk of work accidents.

However, humans have physical obstacles or deficiencies in doing a job. Physical limitations are an important element that must be considered when preparing work plans because if certain jobs require human energy that exceeds physical capabilities, this is what causes risk factors for musculoskeletal disorders to arise.<sup>2</sup>

MSDs represent 40% of global compensation costs for work-related injuries and illnesses.<sup>3</sup> The results of the Labor Force Survey in Great Britain show that the prevalence of workers suffering from work-related musculoskeletal disorders in 2020-2021 was 470,000 cases. This figure is not statistically significantly different from the previous year. Musculoskeletal disorders in the upper limbs or neck were 212,000 cases (45%), the back was 182,000 cases (39%), and the lower limbs were 76,000 cases (16%). As a result of musculoskeletal disorders, it is estimated that 8.9 million working days are lost, in each case an average of 14 working days are lost<sup>4</sup>.

Data from the Central Statistics Agency (BPS) in 2016 shows that 26.74% of the population aged 15 years and over who work experience complaints and health problems. Based on the 2018 Riskesdas results, injuries that disrupted daily activities in Indonesia were 9.2%, and 9.1% of them occurred in the workplace. The prevalence of joint disease in people aged over 15 years in Indonesia is 7.3%, and the prevalence according to type of work, namely farmers or farm laborers is 9.90%, unemployed 9.10%, civil servants, TNI, Polri, BUMN and BUMD 7.50%, fishermen 7.40%, others 7.30%, self-employed 7.30%, workers, drivers, domestic servants 6.10%, private employees 3.50%, schools 1.10%<sup>5</sup>.

## Risk Factors of Musculoskeletal Disorders (Msd) Among Production Workers in Bandung City, Indonesia

The results of previous research show that workers most often complain about musculoskeletal disorders in the lower and upper waist (92.9 percent), such as aches, pain, stiffness, cramps, and tingling are common complaints<sup>6</sup>. Research conducted by Septiani showed that 68.6% or 48 workers experienced complaints of low levels of musculoskeletal disorders, while 31.4% or 22 workers experienced complaints of moderate musculoskeletal disorders.<sup>7</sup> Other studies also show that there is a potential influence of age and workload on MSDs complaints.<sup>8</sup>

Along with ergonomic risks, additional factors were identified that exacerbate complaints of musculoskeletal disorders, including age, gender, length of service, hours worked per day, BMI, smoking habits, as well as physical activity. The majority of work activities involve significant ergonomic risks, requiring immediate action to improve workplace design.<sup>9</sup>

PT. X in Bandung City is an industry in the textile sector, especially gray maklon fabric. The results of observations in a preliminary study conducted on 5 workers consisting of two workers in the weaving division and three workers in the production inspection division using the Nordic Body Map questionnaire, it was discovered that 5 people (100%) of the workers had complaints of musculoskeletal disorders. Among the awkward postures used by weaving division workers and production inspection, division workers are upper arm positions > 20° forward, neck positions > 20° forward, and static standing positions when inspecting rejected fabric, inserting thread into heald, and repairing defects. cloth.

Some of the data in the description above is the basis for researchers to conduct research to find out things that are not yet known, especially regarding risk factors for MSDs.

### 2. METHODS

This research is research with a quantitative approach, a type of analytical observational research with a cross-sectional design. The research was conducted at PT X. Bandung City, which is a textile company (gray maklon fabric). The independent variables in this research are age, length of service, smoking habits, body mass index and work posture, while the dependent variable is MSDs complaints among workers.

The population in this study were workers in the weaving division and inspection division of PT. X Bandung City as many as 186 people. The sample was taken using a probability sampling method with a simple random sampling technique, the sample size was 64 workers. The sample was taken proportionally, where the weaving division had 53 workers, and the inspection division had 11 workers.

The research instruments used include RULA to measure work posture. The Nordic Body Map questionnaire is used to measure MSDs complaints. BMI measurement uses scales and microtoise. Another questionnaire was used to measure age, length of service, and smoking habits, while observations were carried out to obtain data to cloud the research results.

Analysis of research data is divided into two, including descriptive analysis to determine the frequency distribution of age, years of work, smoking habits, body mass index, work posture, and MSDs complaints. The inferential analysis used is the Chi-Square test ( $\chi^2$ ) to determine the relationship and differences in proportions between variables.

### 3. RESULTS

Results of research on risk factors for Musculoskeletal Disorders (MSDs) complaints in PT Production Division workers. X in Bandung City is as follows:

**Table 1. Distribution of Age, Years of Service, Smoking Habits, Body Mass Index (BMI), Work Posture, and MSDs Complaints**

| Variable                | n  | %     |
|-------------------------|----|-------|
| <b>Age</b>              |    |       |
| ≤ 35 years              | 27 | 42,2% |
| > 35 years              | 37 | 57,8% |
| <b>Years of service</b> |    |       |
| ≤ 5 years               | 26 | 40,6% |
| > 5 years               | 38 | 59,4% |
| <b>Smoking habit</b>    |    |       |
| No                      | 49 | 76,6% |
| Yes                     | 15 | 23,4% |
| <b>BMI</b>              |    |       |
| No Risk                 | 51 | 79,7% |
| At Risk                 | 13 | 20,3% |
| <b>Work Posture</b>     |    |       |
| No Risk                 | 18 | 28,1% |
| At Risk                 | 46 | 71,9% |

## Risk Factors of Musculoskeletal Disorders (Msds) Among Production Workers in Bandung City, Indonesia

| MSDs      |    |       |
|-----------|----|-------|
| Low       | 10 | 15,6% |
| Medium    | 21 | 32,8% |
| High      | 23 | 35,9% |
| Very high | 10 | 15,6% |

Based on table 1, shows that the majority of workers are > 35 years old with a percentage of 57.8%. The results of the analysis also show that the average worker is 36 years old, with the youngest being 19 years old and the oldest being 75 years old. that the majority of workers have worked > 5 years with a percentage of 59.4%. The results of the analysis also show that the average worker has worked > 5 years because there are permanent employee contract regulations following the company's needs so many workers who have worked > 5 years experience complaints of musculoskeletal disorders. Almost all workers do not have a smoking habit with a percentage of 76.6%. The results of the analysis also show that the majority of workers who do not smoke are female and the majority of female workers do not have the habit of smoking. Almost all workers have a non-risk BMI with a percentage of 79.7%. The results of the analysis also show that workers with BMI values are not at risk because the majority of workers have normal BMI values (18.5-24.9). Almost all workers have risky work postures with a percentage of 71.9%. The results of observations show that there are still many machines that have not been provided with bearings to adjust the height of the machine so many workers are at risk of experiencing complaints of musculoskeletal disorders.

**Table 2. Relationship between age, length of service, smoking habits, body mass index (BMI), work posture, and MSDs complaints**

| Variable                | MSDs |      |        |      |      |      |           |      | P value |
|-------------------------|------|------|--------|------|------|------|-----------|------|---------|
|                         | Low  |      | Medium |      | High |      | Very High |      |         |
|                         | n    | %    | n      | %    | n    | %    | n         | %    |         |
| <b>Age</b>              |      |      |        |      |      |      |           |      |         |
| ≤ 35 years              | 9    | 33,3 | 12     | 44,4 | 6    | 22,2 | 0         | 0,0  | 0.000   |
| > 35 years              | 1    | 2,7  | 9      | 24,3 | 17   | 45,9 | 10        | 27,0 |         |
| <b>Years of service</b> |      |      |        |      |      |      |           |      |         |
| ≤ 5 years               | 10   | 38,5 | 11     | 42,3 | 5    | 19,2 | 0         | 0,0  | 0.000   |
| > 5 years               | 0    | 0,0  | 10     | 26,3 | 18   | 47,4 | 10        | 26,3 |         |
| <b>Smoking habit</b>    |      |      |        |      |      |      |           |      |         |
| No                      | 8    | 16,3 | 18     | 36,7 | 14   | 28,6 | 9         | 18,4 | 0.157   |
| Yes                     | 2    | 13,3 | 3      | 20,0 | 9    | 60,0 | 1         | 6,7  |         |
| <b>BMI</b>              |      |      |        |      |      |      |           |      |         |
| No Risk                 | 9    | 17,6 | 19     | 37,3 | 17   | 33,3 | 6         | 11,8 | 0.169   |
| At Risk                 | 1    | 7,7  | 2      | 15,4 | 6    | 46,2 | 4         | 30,8 |         |
| <b>Work Posture</b>     |      |      |        |      |      |      |           |      |         |
| No Risk                 | 6    | 33,3 | 7      | 38,9 | 3    | 16,7 | 2         | 11,1 | 0.042   |
| At Risk                 | 4    | 8,7  | 14     | 30,4 | 20   | 43,5 | 8         | 17,4 |         |

Based on the research results, it shows a p-value of 0.000 ( $p\text{-value} \leq 0.05$ ) so it can be concluded that there is a significant relationship between age and MSDs complaints. The statistical test results use a p-value of 0.000 ( $p\text{-value} \leq 0.05$ ) so it can be concluded that there is a significant relationship between length of service and MSDs complaints. The statistical test results use a p-value of 0.157 ( $p\text{-value} > 0.05$ ) so it can be concluded that there is no significant relationship between smoking habits and MSDs complaints. The statistical test results use a p-value of 0.169 ( $p\text{-value} > 0.05$ ) so it can be concluded that there is no significant relationship between body mass index and MSDs complaints. The statistical test results obtained a p-value of 0.042 ( $p\text{-value} \leq 0.05$ ) so it can be concluded that there is a significant relationship between work posture and MSDs complaints.

## 4. DISCUSSIONS

### 4.1 Relationship between Age and MSDs Complaints

There is a relationship between age and complaints of musculoskeletal disorders (MSDs). This is in line with the theory that skeletal muscle complaints generally occur at working age, namely 25-65 years. The first complaint is usually experienced when you are 35 years old and the level of complaints will increase as you get older. This happens because in middle age, muscle strength and endurance begin to decline so that the risk of muscle complaints increases. Age has a very strong relationship with muscle complaints, especially the neck and shoulder muscles, and several other experts have even stated that age is the main cause of muscle complaints.<sup>9</sup>

## **Risk Factors of Musculoskeletal Disorders (Msds) Among Production Workers in Bandung City, Indonesia**

A person's optimal physical capacity is achieved between the ages of 25-30 years and a person's physiological capacity will decrease by 1% per year after peak conditions are reached so that the body becomes more susceptible to infectious and degenerative diseases.<sup>9</sup> In this study, workers under or over 35 years of age could experience complaints of musculoskeletal disorders, which differentiated them from the level of perceived complaints. There is a possibility that complaints of musculoskeletal disorders will arise among production workers because all workers, both young and old, have the same tasks.

This research is in line with research by Marinawati and Siti on oil palm harvesting workers in Rantau District, Jambi City, that workers aged  $\leq 35$  years experienced MSDs complaints as many as 5 people, while those aged  $> 35$  years mostly experienced MSDs complaints as many as 25 people. It is known that worker age has a significant relationship with MSDs complaints.<sup>8</sup>

Apart from that, this is in line with Sari's research which states that there is a significant relationship between age and MSDs complaints among laundry workers on Jalan Prof. Dr. Soepomo Janturan Yogyakarta. From the research results it is known that the majority of workers are  $> 30$  years old, meaning that the proportion of MSDs in workers who are at risk is greater than the proportion of MSDs in workers who are not at risk.<sup>10</sup>

Based on the research results, the majority of workers are  $> 35$  years old. According to the head of production, this is because production workers have quite a long work experience so the majority of workers are over 35 years old. Therefore, to overcome the increasing level of complaints in workers aged  $> 35$  years, workers need to exercise diligently, eat healthy food, avoid stress, and get enough sleep.

### **4.2 Relationship between Work Period and MSDs Complaints**

The research results show that there is a relationship between work experience and complaints of musculoskeletal disorders. Working period is one of the risk factors for musculoskeletal disorders, especially for types of work that use high workforces. Working period has a strong relationship with muscle complaints. The longer a person's working period means the longer the person is exposed to sources of danger in the workplace, the more vulnerable a person will be to health problems that can arise from their work.<sup>9</sup>

This is in line with the theory that the longer a person works, the higher the possibility of experiencing MSDs complaints because complaints will increase with increasing time. The prevalence of MSDs increases with the amount of time or length of time working in the same place. The length of time worked is closely related to their knowledge and adaptation to the dangers and risks in the workplace, so inexperienced workers will have a higher probability of experiencing MSDs injuries<sup>11</sup>.

Work period is a factor related to the length of time a person works at a company. Observation results show that work activities carried out in the workplace have the potential to cause complaints of musculoskeletal disorders, where this condition can reduce the blood flow that carries oxygen throughout the body, as a result, workers will get tired easily, causing the spine and muscles to feel sore.

Based on the results of interviews with production workers, it is known that most workers have quite a long working period of  $> 5$  years. Workers also tend to carry out the same work activities from time to time. This is because a work process requires expertise in operating production machines from a worker so it is not possible for the work to be carried out by workers who are not used to doing it.

This research is in line with Avilia's research on fishermen in North Lembah District, Bitung City, namely that there were 47 fishermen with a working period of  $> 5$  years, while at least those with a working period of  $\leq 5$  years were 4 fishermen. The results of this study indicate that there is a significant relationship between length of service and complaints of musculoskeletal disorders among fishermen in North Lembah District, Bitung City.<sup>12</sup>

Apart from that, the results of this research are in line with research by Tjahayuningtyas (2019), it is known that from 18 workers with a work period of  $< 5$  years and 20 workers with a work period of  $> 5$  years, the results showed that there was a relationship between work period and MSDs complaints among informal workers or manufacturing workers. know. Based on the results of the correlation coefficient, shows a positive relationship, the longer the work period, the MSDs complaints also increase.<sup>13</sup> Mitigation efforts to minimize MSDs complaints caused by the length of a person's work period, prevention efforts can be carried out by continuing to pay attention to workers who have worked for more than five years who experience MSDs complaints so that an evaluation of the performance of production workers is carried out by monitoring improvements to work systems and workloads. work that can result in musculoskeletal disorders.

### **4.3 Relationship between smoking Habits and MSDs complaints**

The results of the study showed that there was no relationship between smoking habits and complaints of musculoskeletal disorders. The smoking habit is one of the factors that can cause musculoskeletal disorders. The smoking habit will reduce lung capacity, so the ability to consume oxygen also decreases. Workers will get tired easily because the oxygen content in the blood is low, the burning of carbohydrates will be hampered and there will be a buildup of lactic acid which ultimately causes pain in the muscles<sup>9</sup>.

The nicotine content in cigarettes can cause a decrease in blood flow. In addition, smoking can reduce the mineral content in bones and cause microfractures. It is also said that back pain is caused by coughing due to smoking. Coughing increases abdominal

## **Risk Factors of Musculoskeletal Disorders (Msds) Among Production Workers in Bandung City, Indonesia**

pressure and intradiscal pressure, causing strain on the spine. This can be one of the causes of complaints among workers who have a smoking habit. Someone who smokes 10 cigarettes per day has an increased risk of MSDs reaching 20%.<sup>9</sup>

Based on this theory, smoking habits need to be a concern for companies and workers considering that cigarettes contain various substances that can damage the body. Thus, even though there is no relationship between smoking habits and complaints of musculoskeletal disorders in production workers, the smoking habit is still a factor that needs to be watched out for, considering that the longer and the higher the frequency of smoking, the more the perceived complaints will increase.

Observation results show that workers usually carry out activities together. Likewise, during rest time there is the same tendency to smoke. However, the amount of cigarette consumption is different for each worker, so if you look at the amount of cigarette consumption, each individual should have different effects or dangers from the dangers of smoking. However, the increased risk received by smokers among production workers does not only occur in workers who have a smoking habit, but workers who do not smoke also have the same risk because all workers live in the same environment and have a tendency to inhale cigarette smoke from workers. others who smoke.

Cigarette smoke inhaled either as an active smoker or a passive smoker can reduce lung capacity so that the ability to consume oxygen decreases and if the person concerned has to carry out tasks that require exertion of energy, they will easily get tired because the oxygen content in the blood is low, the burning of carbohydrates is hampered, which occurs. a buildup of lactic acid and ultimately muscle pain<sup>9</sup>. However, the effects caused by the dangers of smoking are chronic, so researchers suspect that at the time the research was carried out, the dangers of smoking had not been able to have a significant effect on the physical quality of workers.

This research is in line with Septiani's research on Meat Preparation workers, it was found that 15 people had moderate complaints and the remaining 28 people had low MSDs complaints. Meanwhile, among workers who do not smoke/have stopped smoking, 7 workers have moderate complaints. The results of bivariate analysis using the chi-square test showed that there was no significant relationship between smoking habits and the occurrence of MSDs complaints.<sup>7</sup>

Apart from that, the results of this study are also in line with Bukhori's research which showed that as many as 12 out of 15 workers with a smoking habit of  $\geq 10$  cigarettes per day were in the category of complaining about MSDs. Meanwhile, workers with a smoking habit of  $<10$  cigarettes per day complained of MSDs as many as 26 out of 33 workers. The results of statistical tests show that there is no significant relationship between smoking habits and MSDs complaints among gold miners.<sup>14</sup>

Based on the results of interviews with the Company's HRD, it is known that the majority of production workers are female and most female workers do not have the habit of smoking. So the advice that can be given, for workers who have a smoking habit, workers should reduce the number of cigarettes consumed per day and for workers who do not smoke, it is better to avoid cigarette smoke that comes from their environment.

### **4.4 Relationship between BMI and MSDs Complaints**

The results of the study showed that there was no relationship between body mass index and complaints of musculoskeletal disorders. Body mass index is an indicator of a person's nutritional status. According to Tarwaka (2019), although the influence is relatively small, body weight, height and body mass are factors that can cause musculoskeletal system complaints.<sup>9</sup>

According to Supariasa (2002), Body Mass Index (BMI) is a simple tool or way to monitor the nutritional status of adults, especially those related underweight and overweight. The relationship between BMI and MSDs is that the fatter a person is, the greater the risk of experiencing MSDs. This is because someone who is overweight will try to support their body weight from the front by contracting their lower body.<sup>15</sup>

In theory, body mass index is a factor associated with complaints of musculoskeletal disorders, but the results of this study obtained different results. Based on the results of observations and calculations of body mass index values, this discrepancy could occur because research respondents had a normal average body mass index. Apart from that, work activities in the production section do not require strong energy because they do not have additional burdens.

This is following what was explained by Tarwaka (2019) who stated that musculoskeletal system complaints related to human body size are more caused by the balance condition of the skeletal structure in receiving loads, both the weight of the human body itself and other additional loads.<sup>9</sup>

This research is in line with Tjahayuningtyas' research on informal workers showing that of the 24 workers in the normal BMI category, 11 workers in the BMI category were fat and there was also 1 worker in the very thin BMI category. Based on the level of complaints, it is known that MSDs complaints in the high category were experienced by 5 workers who had BMIs in the normal category. The results of the data analysis showed that there was no significant relationship between BMI and the occurrence of MSDs complaints in tofu making workers.<sup>13</sup>

Apart from that, this research is also in line with Rahayu's research, it is known that the majority of workers in the Personnel Bureau with an abnormal BMI category experienced complaints of high MSDs, as many as 26 workers. Based on the results of the chi-square statistical test, shows that there is no significant relationship between the BMI variable and MSDs complaints among workers at the Civil Service Bureau.<sup>16</sup>

According to several studies, body mass index is related to complaints of musculoskeletal disorders. The fatter a person is (the higher the body mass index), the greater the risk of experiencing MSDs. So the advice that can be given to workers with a body



## **Risk Factors of Musculoskeletal Disorders (Msd) Among Production Workers in Bandung City, Indonesia**

mass index value in the obese category (25.0-29.9) at risk of MSDs is that they need to further improve monitoring of the nutritional status of each production worker so that workers who have poor nutritional status are caught early and receive treatment immediately by looking at the BMI indicator. Apart from that, companies can carry out training and counseling programs aimed at production workers on how to work ergonomically.

### **4.5 Relationship between Work Posture and MSDs Complaints**

The research results show that there is a relationship between work posture and complaints of musculoskeletal disorders. Work posture or attitude is an action taken by a worker when doing work. This is in line with the theory that work posture is one of the factors that can influence the emergence of MSDs complaints in workers because while doing work, this factor will continuously expose workers. Muscles that are used to continue working can become tired, the muscles are unable to continue working or the muscle's ability to produce maximum force is reduced.<sup>2</sup>

Standing working posture for a long time will make the worker always try to balance his body position, causing a static workload on the back and leg muscles. This condition also causes blood to collect in the lower limbs. Work with a static standing work posture is a risk factor if the duration is 10 seconds and the frequency is 2 times/minute.<sup>17</sup>

Observation results showed that there were odd postures when carrying out work activities, including crossing the warp or weft threads with the neck down and bent, checking and improving the quality of the fabric in a static standing position, as well as raising and extending hand movements. Work posture in work activities carried out by production workers, especially weaving or weaving division workers (the process of crossing warp or weft threads) and inspection division workers (the process of checking and improving the quality of fabric) is calculated based on analysis carried out using the RULA method, in a standing position for  $\pm 7$  hours.

Assessment of the risk level of work postures is based on the RULA method, grouping the body into two parts. The assessment was carried out on the body in group A (upper arm, forearm, and wrist) which was added with a muscle use score and load score, and group B (neck, trunk, and legs) was added with a muscle use score and load score. The results of these calculations then become a benchmark in research on work posture risk levels. The value of each body posture is one of the influences on the significant relationship between work posture and MSDs complaints.

The results of the RULA calculation show that workers have low, medium and high-risk levels. This is one factor in the relationship between work posture and complaints of musculoskeletal disorders because the data obtained overall varies. The RULA risk level with a score of 5-7+ is the risk level that requires corrective action. One improvement that can be made is by adjusting the height of the machine and workers. Taller workers will usually tend to bend towards the machine to adjust the working position. The bent position will affect the score when assessing risk factors, the more bent the worker's position, the higher the risk level of the job.<sup>7</sup>

Adjusting the height of the machine to the worker can be done considering that almost all workers have a risky neck position and a small number of workers have a risky body position. The height of the machine can be raised according to the height requirements of the worker by providing pads under the machine's legs, however, based on observations made there are still many machines that have not been provided with pads. By adding padding to the machine, the worker's body and neck position will not bend too much, so the final RULA score will change.

This research is in line with research by Evadariato (2017) in the Rolling Mill section which shows that as many as 11 workers have high risks in their work. The results of the Spearman correlation test between work posture and MSDs complaints show that there is a very strong relationship between work posture and MSDs complaints. This proves that the incidence of MSDs complaints is caused by poor working posture or lack of ergonomics.<sup>17</sup>

Apart from that, this research is also in line with research by Nidaan et al., (2019) on baggage handling workers, it is known that workers with MSDs complaints are more common in workers with high-risk work postures, namely 19 people. The results of statistical tests using chi-square show that there is a significant relationship between work posture and MSDs complaints among baggage handling service workers.<sup>18</sup>

Based on Minister of Manpower and Transmigration Regulation No. 02 of 1980 concerning worker health checks in implementing work safety, the advice that can be given is that companies can carry out regular health checks on workers. Examinations are carried out by the local health center once a month. In addition, workers can learn about musculoskeletal hazards and how to overcome them. Workers can also take advantage of the rest time by stretching for  $\pm 5$  minutes and are advised to drink herbal medicine made from ginger which can be useful in reducing knee pain considering that production workers often complain about the knees, calves, and feet.

## **5. CONCLUSIONS**

Based on the research results, it can be concluded that the risk factors for MSDs include age, years of work, and work posture following the results of the analysis which shows that there is a relationship between age, time, and work posture, and MSDs complaints. Meanwhile, there was no relationship between BMI and smoking habits and MSDs complaints. There are several things

## Risk Factors of Musculoskeletal Disorders (Msd) Among Production Workers in Bandung City, Indonesia

that workers and companies can do to control ergonomic risks, including stretching for  $\pm 5$  minutes before work, modifying the height of the machine so that it allows workers to be in a safe position and educating workers about overcoming MSDs.

### Declaration by Authors

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