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Prevalence of Musculoskeletal Disorders Associated with 3 Types of Work in Indonesia

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Abstract: In Indonesia research related to Musculoskeletal Disorders (MSDs) is still in the developing phase. MSDs have been analyzed as a major cause of errors, accidents and absences of workers in many countries and industries. This study investigated the prevalence of MSDs and the relationships between office workers, garbage collectors, and farmers. A direct survey was completed in December 2023. A total of 60 questionnaires were fully filled in and used for data analysis. These three occupational groups were chosen as a comparison of MSD risk in formal and informal work in developing countries mainly in Indonesia. The purpose of this study is to determine the prevalence of musculoskeletal disorders in each work group so that it is expected to provide an understanding of the magnitude of the problems associated with MSD and can also be used as a basis for carrying out more effective ergonomic interventions. A questionnaire of the Standardized Nordic Questionnaire (SNQ) was used in this study. The prevalence of MSDs in the three occupational groups with an average high score was in the neck, shoulders, lower back and knees. The highest prevalence of MSDs for each type of work is for office workers is the neck area (70%), for garbage transport is the shoulder area (85%), and for farmers is the lower back area (70%). Length of work and duration of work per day are variables that have a significant relationship with MSD complaints that were felt during the last 12 months in all three work groups. Although no statistical testing was conducted, the second group consisting of garbage transporters tended to have a higher prevalence compared to the other groups.

Keywords: Musculoskeletal Disorder, Nordic Musculoskeletal Questioner, Office Work, Garbage Collector, Farmer

INTRODUCTION

Musculoskeletal disorders (MSDs) are defined as injuries and disorders that affect the movement of the human body or musculoskeletal system (Kroemer and E. Grandjean, 1997). Musculoskeletal injuries are the leading cause of occupational diseases in the industrial sector of developed and developing countries (Bongers, 2006). Research shows that 75% of hospital nurses and nursing home caregivers in Indonesia reported experiencing musculoskeletal complaints in the past year, with the most common complaints occurring in the upper and lower back (Iridiastadi et al., 2019). A study among academic staff in Jakarta in 2020 found that 73.8%

of respondents experienced MSD complaints, with the main risk factor being poor sleep quality (Tam et al., 2021). Recent studies have shown that the prevalence of musculoskeletal disorders in Indonesia in 2020 reached 11.9% based on diagnosis, and 24.7% based on symptoms. Factors associated with MSD complaints among workers in Bandung include age, length of service, and work posture (Suherdin et al., 2023). MSDs have been analyzed as the main cause of errors, accidents, and worker absenteeism in many countries and industries. In fact, MSDs have been found in many industries, especially those that require a lot of physical strength (Rahayuningsih, 2018).

Work-related disorders are defined as musculoskeletal injuries caused by occupational events. These disorders are common in jobs that require manual labor, heavy lifting, or repetitive motion, and may lead to changes in work habits, reduced working hours, working time, or changes in employment. There are several factors such as occupational factors, worker or individual factors, environmental factors and psychosocial factors identified as factors that can cause MSDs. The main risk factors associated with work-related musculoskeletal disorders and often discussed are work posture, *force* or load, duration, repetitive motion (frequency), body mass index, inappropriate physical conditions, equipment used and high work pressure. As for worker factors or individual factors, they can be explained in terms of age, gender, length of work, smoking habits, physical fitness, body mass index and physical strength.

In Indonesia, research related to MSDs mostly focuses on the construction industry where 68.6% of workers have MSD risks (Jalajuwita and Paskarini, 2015), health workers (Phedy, 2016), drivers (Sekaraam and Ani, 2017), office workers (Dinar et al. 2017) and farmers (Jain et al. 2017). Although many fields have been studied, there have not been many studies that discuss the risk of MSDs in janitorial workers. Looking at the characteristics of the job, janitorial workers are one of the jobs that are vulnerable to the risk of MSDs.

This study attempts to analyze MSDs in three occupational groups, namely office workers, farmers and janitors. These three occupational groups were chosen because these occupations are widely practiced in developing countries, especially Indonesia and also have MSD risks. Office workers must sit in the same position for a long duration. Farmers must work with heavy physical loads by using manual work equipment that has the risk of unergonomic work postures and such as bending for a long time. Meanwhile, janitorial workers must transport/pull carts filled with garbage with heavy loads and with unergonomic work postures. The jobs performed by farmers and sanitation workers have repetitive movements with a fairly frequent frequency. Factors such as occupational factors in the three occupational groups that have been mentioned a little earlier are identified as factors that can cause MSDs.

This paper is a preliminary study that aims to provide relevant information on the existence of musculoskeletal disorders in three different occupational groups, namely office workers, farmers, and janitors. The results of this preliminary study are expected to provide an understanding of the magnitude of MSD-related problems and can also be used as a basis for conducting more effective ergonomic interventions.

METHOD

The research approach used is a quantitative approach supported by qualitative data. The data collection method uses a questionnaire to obtain quantitative data, while to obtain qualitative data obtained from the results of quantitative data processing. Questionnaire data collection was completed until the end of December 2023 in several areas that were considered representative of their respective populations. The participants used in this study consisted of three groups of workers, namely office workers, cleaners and farmers. Each group of workers was sampled as many as 20 respondents.

The data collection process was carried out directly, namely by distributing questionnaires *Nordic Musculoskeletal Questioner* Bahasa Indonesia version to office workers, cleaners, and farmers. Each respondent will be given an explanation first about the parts of the

questionnaire and the procedure for filling it out. Respondents were then asked to fill out a questionnaire related to complaints of pain or pain felt in the body during work.

The questionnaire used is the *Nordic Musculoskeletal Questionnaire* which has been translated into Bahasa Indonesia. The total number of questions in the questionnaire is 59, which is divided into two parts. The first part (part A) is demographic data, which is then further divided into 3 categories, namely respondent's personal data, company data and job data. Respondents' personal data consisted of gender, age, height, weight, and section, education, and ethnicity. Company data consists of industry type, number of employees, and industry location. Occupational data consists of specialization/division of workers, length of work, average working hours per day, whether workers are left-handed when working and whether workers work in shifts. The second part is a section to fill in complaints felt by respondents on their body parts. The second part (Part B) contains data on complaints felt by workers on body parts when doing their work.

The data obtained will be processed to determine the frequency of each complaint in several limbs so that the prevalence of MSD can be known. The relationship between each variable will be determined using the $\chi 2$ test for independence. The significance of the test is set at $p<0.05$.

RESULTS AND DISCUSSION

The first group of office workers consisted of 20 respondents with the proportion of type. There was an almost equal gender balance, with 12 female respondents (60%) and 8 male respondents (40%). A total of 75% of respondents work for 8 hours/day, 20% work for more than 8 hours/day, and 5%work for less than 8 hours/day. The types of jobs are marketing (15%), human resources (10%), finance (10%), IT support (10%), and the rest are divided into various types of jobs ranging from merchandiser to internal audit. The majority of office worker respondents are in the age range of 20-30 years (90%) andthe rest are in the range of 30-40 years (10%). Data on respondent characteristics can be seen in Table 1.

Table 1. Data on the characteristics of office worker respondents

Respondent characteristics		Gender				Total	
		Male		Female			
		Total	Percentage	Total	Percentage	Total	Percentage
Age	20-30 years old	6	75,00%	12	100,00%	18	90,00%
	30-40 years old	2	25,00%	0	0,00%	2	10,00%
Working Hours/days	5-10 hours	8	100,00%	12	100,00%	20	100,00%
Length of Service	<1 years	0	0,00%	1	8,33%	1	5,00%
	1-5 years	6	75,00%	11	91,67%	17	85,00%
	5-10 years	2	25,00%	0	0,00%	2	10,00%

Complaints related to discomfort felt in various limbs over the past 12 months, activities interrupted due to the pain felt, and complaints felt over the past 7 days are shown in Table 2. Over the past 12 months, complaints of discomfort with high scores (more than 50%) were felt in the neck, shoulders, and lower back. This discomfort, on average, did not cause hindrance to activities or work performed. While in the last 7 days there are not many complaints. The highest prevalence of MSD for office workers is inthe shoulder (30%).

The results of further analysis using the $\chi 2$ test for independence, showed that there was asignificant relationship between the length of working time and MSD complaints in the ankle ($p<0.05$).

Table 2. Prevelance of MSD injury complaints in office workers

Body parts affected by MSDs	Last 12 months		Obstructed activity		Last 7 days	
	Frequency	Prevalence	Frequency	Prevalence	Frequency	Prevalence
Neck						
Yes	14	70.00%	1	5.00%	4	20.00%
No	6	30.00%	19	95.00%	16	80.00%
Shoulders						
Yes	12	60.00%	2	10.00%	6	30.00%
No	8	40.00%	18	90.00%	14	70.00%
Upper back						
Yes	9	45.00%	2	10.00%	2	10.00%
No	11	55.00%	18	90.00%	18	90.00%
Elbow						
Yes	3	15.00%	0	0.00%	1	5.00%
No	17	85.00%	20	100.00%	19	95.00%
Lower back						
Yes	13	65.00%	5	25.00%	4	20.00%
No	7	35.00%	15	75.00%	16	80.00%
Wrist						
Yes	8	40.00%	2	10.00%	5	25.00%
No	12	60.00%	18	90.00%	15	75.00%
Buttocks/thighs						
Yes	5	35.00%	3	15.00%	2	10.00%
No	13	65.00%	17	85.00%	18	90.00%
Knees						
Yes	6	30.00%	1	5.00%	3	15.00%
No	14	70.00%	19	95.00%	17	85.00%
Ankle						
Yes	6	30.00%	2	10.00%	2	10.00%
No	14	70.00%	18	90.00%	18	90.00%

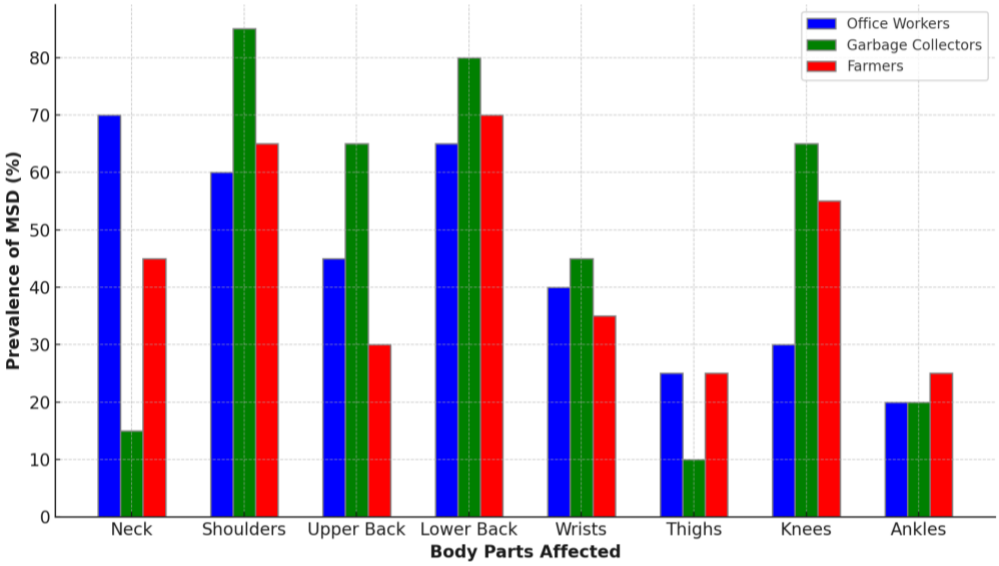

Figure 1. Prevalence of Musculoskeletal Disorders (MsD) by Body Part and Occupational Group

The second group consisted of people who work as cleaning staff, especially in the wastetransportation section, consisting of 20 respondents with male gender. The majority of respondents were over 50 years old (65%) with a length of service of more than 10 years (85%). Of the total respondents,the average work time is 5-10 hours/day. More complete data on the characteristics of respondents for the cleaning staff group can be seen in Table 3.

Table 3. Data on the characteristics of cleaning staff respondents

Respondent characteristics		Gender				Total	
		Male		Female			
		Total	Percentage	Total	Percentage	Total	Percentage
	30-40 years old	3	15,79%	0	0,00%	3	15,79%
	40-50 years old	4	21,05%	0	0,00%	4	21,05%
	>50 years old	12	63,16%	0	0,00%	12	63,16%
Working Hours/day	<5 hours	4	21,05%	0	0,00%	4	21,05%
	5-10 hours	10	52,63%	0	0,00%	10	52,63%
	>5 hours	5	26,32%	0	0,00%	5	26,32%
Length of Service	1-5 years	3	15,79%	0	0,00%	3	15,79%
	>10 years	15	78,95%	0	0,00%	15	78,95%

Complaints related to discomfort felt in various limbs are shown in Table 4. Over the past 12 months, the highest discomfort was felt in the shoulder (85%), upper back (65%), lower back (80%), knee(65%), elbow (45%) and wrist (45%). The discomfort that arose especially in the shoulders, upper back, lower back, wrists and knees hindered activities or work performed. In the last 7 days, the highest complaints were felt in the lower back (55%).

The results of further analysis using the $\chi 2$ test for independence, showed a significant relationship between age, working hours per day with MSD complaints in several parts of the body ($p<0.05$).

Table 4. Prevelance of MSD injury complaints in janitors

Body parts affected by MSDs	Last 12 months		Obstructed activity		Last 7 days	
	Frequency	Prevalence	Frequency	Prevalence	Frequency	Prevalence
Neck						
Yes	3	15.00%	1	5.00%	0	0.00%
No	17	85.00%	19	95.00%	20	100.00%
Shoulders						
Yes	17	85.00%	13	65.00%	5	25.00%
No	3	15.00%	7	35.00%	15	75.00%
Upper back						
Yes	13	65.00%	9	45.00%	3	15.00%
No	7	35.00%	11	55.00%	17	85.00%
Elbow						
Yes	9	45.00%	1	5.00%	0	10.00%
No	11	55.00%	19	95.00%	20	100.00%
Lower back						
Yes	16	80.00%	13	65.00%	11	55.00%
No	4	20.00%	7	35.00%	9	45.00%
Wrist						
Yes	9	45.00%	8	40.00%	1	5.00%
No	11	55.00%	12	60.00%	19	95.00%
Buttocks/thighs						
Yes	2	10.00%	1	5.00%	0	0.00%
No	18	90.00%	19	95.00%	20	100.00%
Knees						
Yes	13	65.00%	9	45.00%	3	15.00%
No	7	35.00%	11	55.00%	17	85.00%
Ankle						
Yes	4	20.00%	4	20.00%	3	15.00%
No	16	80.00%	16	80.00%	17	85.00%

The last group is people who work as farmers consisting of 20 respondents with a ratio of 5female respondents (75%) and 15 male respondents (25%). Of the total respondents, the average work time is 5-6 hours/day. The majority of farm worker respondents have worked for more than 10 years (90%), the rest have worked for 5-10 years (5%) and less than 1 year

(5%). Data on respondent characteristics for more details can be seen in Table 5.

Table 5. Farmer respondent characteristics data

Respondent characteristics		Gender				Total	
		Male		Female			
		Total	Percentage	Total	Percentage	Total	Percentage
Age	20-30 years old	2	16,67%	0	0,00%	2	10,00%
	30-40 years old	1	8,33%	1	12,50%	2	10,00%
	40-50 years old	2	16,67%	3	37,50%	5	25,00%
	>50 years old	7	58,33%	4	50,00%	11	55,00%
Working Hours/day	<5 hours	0	0,00%	1	12,50%	1	5,00%
	5-10 hours	8	66,67%	0	0,00%	8	40,00%
	>5 hours	4	33,33%	7	87,50%	11	55,00%
Length of Service	1-5 years	3	25,00%	0	0,00%	3	15,00%
	>10 years	9	75,00%	8	100,00%	17	85,00%

Complaints related to discomfort felt in various limbs are shown in Table 6. Total discomfort in the neck, shoulders, knees scored more than 45% over the past 12 months. The discomfort reported didnot hinder the workers' activities or work. In the last 7 days, the highest complaint was felt in the shoulder(30%).

The results of further analysis using the $\chi 2$ test for independence, showed that there was a significant relationship between gender, age, length of working time, working hours per day with MSD complaints in several parts of the body ($p<0.05$).

Table 6. Prevalence of MSD injury complaints among farmers

Body parts affected byMSDs	Last 12 months		Obstructed activity		Last 7 days	
	Frequency	**Prevalence**	**Frequency**	**Prevalence**	**Frequency**	**Prevalence**
Neck						
Yes	8	45.00%	3	15.00%	5	25.00%
Shoulders						
Yes	13	65.00%	4	20.00%	6	30.00%
No	7	35.00%	16	80.00%	14	70.00%
Upper back						
Yes	6	30.00%	0	0.00%	1	5.00%
No	14	70.00%	20	100.00%	19	95.00%
Elbow						
Yes	6	30.00%	4	20.00%	2	10.00%
No	14	70.00%	16	80.00%	18	90.00%
Lower back						
Yes	14	70.00%	3	15.00%	2	10.00%
No	6	30.00%	17	85.00%	18	90.00%
Wrist						
Yes	7	35.00%	3	15.00%	3	15.00%
No	13	65.00%	17	85.00%	17	85.00%
Buttocks/thighs						
Yes	5	25.00%	0	0.00%	0	0.00%
No	15	75.00%	20	100.00%	20	100.00%
Knees						
Yes	11	55.00%	3	15.00%	2	10.00%
No	9	45.00%	17	85.00%	18	90.00%
Ankle						
Yes	5	1.00%	5	10.00%	1	5.00%
No	15	19.00%	95	90.00%	19	95.00%

In addition to data on the prevalence of MSDs among workers, the severity of MSDs was also measured using a Likert scale with a scale of 1-10. Scale 1 describes the complaints

felt by workers as no pain while scale 10 describes very severe complaints.

Discussion

The results of this study show that the prevalence of MSD complaints during the last 12 monthsin 3 occupational groups is relatively high, ranging from 40%-70%. This is due to work factors which are the main risk factors associated with musculoskeletal disorders and worker or individual factors. From the results of data processing that has been done, it is stated that there are MSD complaints that cause discomfort in various limbs where the three work groups have the same complaints, namely in the neck and lower back. Complaints in the last 7 days also have similarities, namely in the shoulder limbs which are the highest complaints. In the three groups, the results showed that work factors that cause MSD complaints are related to work, namely the length of working time and working hours per day. As for worker or individual factors related to age and gender, where complaints are more often experienced by men and over the age of 30 years.

The first group of respondents consisting of office workers found that the highest prevalence of MSDs (Table 2) was in the neck (70%), shoulders (60%), upper back (45%), lower back (65%), and wrists(45%). The majority of discomfort complaints were felt in the upper limbs. This may be due to office jobssuch as HRD, finance, marketing and other jobs that are mostly done in a static and monotonous sitting position such as operating a computer so that it requires more upper body roles. Based on the results of correlation analysis between variables, it is also known that the length of working time has a significant relationship with MSD complaints in several parts of the body. Although not statistically proven, the hypothesis that then arises is that workers who have worked the longest are more vulnerable to the risk of MSD. The longer working time and doing monotonous work during work can increase the risk obtained by workers and require a long time to recover energy (NIOSH, pub 97-117, 1997). In the categorization,if < 1 hour / day can be categorized as short duration, if 1 to 2 hours / day can be categorized as medium duration and > 2 hours / day can be categorized as long duration (Bird, 2005). Of the total respondents, 75% worked for 8 hours/day, 20% worked for more than 8 hours/day and 5% worked less than 8 hours/day. From these results it can be said that all respondents have a long duration category in doing their work. In this group of office workers, the main cause of MSD complaints is due to work factors, namely related to work position and work duration. To reduce the complaints experienced while working, workers can do small stretches at certain times to reduce MSD complaints. Of the total respondents, 75% work for 8 hours/day, 20% work for more than 8 hours/day, and 5% work for less than8 hours/day.

The second group of respondents consisting of janitors showed that the highest prevalence (Table 4) was in the shoulder (85%), upper back (65%), lower back (80%), knee (65%), elbow (45%) and wrist (45%) body parts. The discomfort in these areas may be due to the workload and posture performed bythe cleaning staff. When working, respondents must carry heavy loads in the form of carts that are pulled by placing the handle lever on the chest. This is what is likely to cause pain in the shoulders, back, elbows and wrists. In addition, the respondents have to carry heavy carts and walk relatively long distances when collecting waste. This may cause pain in the knees. The results of the inter-variable analysis, showed that there is a significant relationship between age, working hours per day with MSD complaints in several body parts with working hours / day is the factor that has the most correlation with several body parts.

In the farmer group, body parts such as the neck (45%), shoulders (65%), lower back (70%) and knees (55%) had high MSD values (Table 6). This is because farmers require a lot of physical activity thatinvolves most of the limbs (upper and lower limbs). Farmers often perform their work in a bent andbowed position, especially when planting seeds, so this is likely to cause the neck and lower back (spinal region) to have high complaint scores. In addition, farmers also use their lower limbs a lot such as for walking, plowing or other work

activities so this can also cause high complaints of pain felt in the knee. Based on the results of correlation analysis between variables, it is known that gender, age, working hours/ day and length of work have a significant relationship to MSD complaints in several parts of the body.

In general, the severity of pain that has begun to be felt by workers but has not interfered with activities is between a scale of 3-6. Whereas above 6 has entered into a condition of reducing productivity. The value of severity felt in the office worker group was highest in the neck (3.53) and shoulder (4.11). Furthermore, in the farmer group, the highest severity was also felt in the shoulder, with an average score not much different from office workers, namely 3.25. While in the janitor group, high pain was felt in several parts, namely the shoulder (4.25), lower back (4.15) and knee (3.25). Of the 20 respondents in the office worker group, there were only 4 (20%) respondents who saw a doctor ortherapist regarding their pain. The same results were also seen in the farmer group. Of the 20 farmer respondents, there were only 4 (20%) respondents who saw a doctor or therapist to consult their complaints. Whereas in the third group, there were 8 (20%) respondents who reported having seen a doctor or therapist regarding their pain. Based on these results, it can be concluded that the community represented by the respondents does not consider MSD symptoms as a serious health problem.

CONCLUSION

The prevalence of MSDs in the three occupational groups with high scores is on average in the neck, shoulders, lower back and knees. While the highest prevalence of MSD for each type of work is for office workers is the neck (70%), for janitors is the shoulder (85%), and for farmers is the lower back (70%). Length of working time and duration of work per day are variables that have a significant relationship with MSD complaints felt during the last 12 months in all three occupational groups. Although no statistical testing was done, the third group consisting of cleaners tended to have a higher prevalence compared to the other groups. The group with the next highest prevalence was farmers and the last group was office workers. Janitorial workers and farmers have a higher prevalence possibly due to work factors that require more physical ability than office workers.

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