Frequency Of Work-Related Musculoskeletal Disorders Among Laundry Workers

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Abstract

Work-related musculoskeletal disorders are a serious problem that can affect the health and productivity of laundry workers. Workers who experience such disorders may experience pain, muscle stiffness, joint inflammation, and even serious injury. This study aimed to investigate the frequency of work-related musculoskeletal disorders among laundry workers in North Sulawesi. This study was a quantitative, descriptive cross-sectional survey conducted over 1 month in the Tondano - Tomohon Region. A total sample of 225 laundry workers was taken using the accidental sampling technique. The questionnaire used was the Nordic Body Map. The chi-square test was applied to analyze the association between age and musculoskeletal disorders among laundry workers. Complaints felt in all parts of the worker's body 5.38% were very pain, 17.81% were pain, 36.39% were rather pain, and 39.67% were not pain. The body part that experienced the most complaints of severe pain was back at 10.2%, feeling pain was the waist at 37.3%, feeling pain was the right arm at 47.1%, and no pain was the left elbow at 71.6%. Frequency of work-related musculoskeletal disorders, specifically back and lumbar pain to severe pain, among laundry workers. An association was found between the age of laundry workers and the frequency of WMSDs. Thus, appropriate interventions need to be taken to improve working conditions, protect workers' health, and minimize the risk of work-related musculoskeletal disorders in the laundry industry.

Keywords: ergonomics, risk assessment, work related musculoskeletal disorders (WMSDs), laundry.

INTRODUCTION

Musculoskeletal Disorders (MSDs), also known as Work-Related Musculoskeletal Disorders (WMSDs) in the context of work, have become a serious problem in various work environments around the world. These diseases are associated with abnormalities in the musculoskeletal system, which includes muscles, tendons, ligaments and bones. In recent years, attention to WMSDs has increased rapidly due to their detrimental impact on worker well-being and work productivity.

According to the World Health Organization (WHO), musculoskeletal disorders (MSDs) are disorders of the muscles, tendons, ligaments, and nerves that can be caused by work, lifestyle, or a combination of both. Work-related MSDs are disorders caused by factors in the workplace, such as repetitive movements, unergonomic postures, heavy loads, and vibrations (Instituto de Ciências da Saúde *et al*., 2019). Based on WHO data in 2019, MSDs are the second leading cause of disability in the world, after heart disease. MSDs are estimated to cause 3.5%

of all years of life lost due to disability (YLDs). According to WHO, there were an estimated 264 million cases of work-related MSDs in the world in 2019.(Dagne *et al*., 2020) The most common types of work-related MSDs are low back pain, neck pain, shoulder pain, wrist and hand pain, and foot pain (Rika *et al*., 2020). Work-related MSDs risk factors include repetitive motion, non-ergonomic postures, weight, vibration, hot or cold working environment, and work stress (Murtoja Shaikh *et al.*, 2022). One group of workers who are vulnerable to WMSDs are workers in the laundry section.

Laundry workers, both in commercial laundries and hospitals, are often involved in tasks that involve heavy lifting, repetitive movements, and prolonged standing. However, research on the frequency and risk factors of WMSDs among laundry workers is limited. Laundry workers are workers who have a high risk of developing musculoskeletal disorders (MSDs) because the tasks they perform routinely involve physical activities that can cause excessive stress on their musculoskeletal system. Some of the job tasks that pose a high risk of MSDs in laundry workers include: Heavy Lifting, one of the main tasks of laundry workers is lifting and moving linen that is often wet and heavy, such as sheets and large towels. Heavy lifting without the use of appropriate assistive equipment can cause stress to the lower back, shoulders and arms, increasing the risk of musculoskeletal injuries and complaints (Mahestri *et al*., 2021). Repetitive Motion, laundry workers often have to perform repetitive motions such as folding clothes, rolling linen, or sewing. These repetitive motions can cause excessive stress on joints, tendons, and muscles, which can eventually lead to disorders such as tendinitis or carpal syndrome (Descatha *et al*., 2020). Unergonomic Body Positions, some laundry work tasks require workers to stand for long periods of time or operate in unergonomic body positions. This can result in strain on the back, legs, and neck, which in turn can cause complaints such as back pain, leg pain, and neck discomfort (Chaitanya, 2022). Use of Heavy Equipment, laundry workers often use heavy equipment such as commercial washing machines, dryers, and irons. operating this equipment repetitively or for long periods of time can affect their joints and muscles. Sorting and Sifting, linen sorting and sorting tasks often require careful and precise hand movements (Purwati *et al*., 2023). Laundry workers have to carefully select, roll and organize linen, which can result in stress on their wrists and fingers. Work Environment Discomfort, some laundry workers may have to operate in uncomfortable work environments, such as cramped spaces or with extreme temperatures. This discomfort can affect their physical well-being.

Previously, many studies have been conducted in various work sectors to understand and identify the risk factors associated with WMSDs. These studies cover the manufacturing industry, healthcare, and transport sectors, and the results have revealed that the risk of WMSDs can be found in various work environments. Research conducted by Purwati *et al.* (2023) showed that there is a significant relationship between work posture and musculoskeletal disorders (MSDs) complaints among laundry workers in Batam City, Indonesia. The majority of respondents were under 35 years old. MSDs are a common occupational risk for laundry workers, and factors such as excessive muscle stretching, repetitive activities, and unnatural work postures contribute to the development of these disorders. While research conducted by Gumilang, (2020) stated that the majority of laundry workers in Denpasar, Bali have a moderate level of risk in developing Musculoskeletal Disorders (MSDs) during the ironing process. Factors contributing to the moderate risk level include female gender, age greater than or equal to 30 years, duration of work per day greater than 8 hours, tenure greater than or equal to 4 years, and adequate nutritional status (Gumilang, 2020).

However, while these studies have provided important insights into WMSDs in various occupational sectors, research on these conditions among laundry workers is still very limited and has not been widely discussed. Laundry workers, both in commercial laundries and

hospitals, are routinely involved in tasks that involve lifting heavy loads such as wet linen, folding large quantities of clothes, and standing for long periods of time. This can increase the risk of developing WMSDs, especially on body parts such as the lower back, shoulders and wrists. This study aims to fill this knowledge gap by investigating the extent of WMSDs among laundry workers in North Sulawesi Province.

METHOD

This study is descriptive in design with observational research that is cross-sectional, carried out in some of the largest laundry places in Tomohon and Tondano City, North Sulawesi, from March to April 2023. This study selected subjects from the inclusion criteria, namely laundry workers who work in the Tomohon and Tondano areas aged 20 years to 60 years, have worked for more than 1 year, and are willing to participate by filling out informed consent. And not included in the exclusion criteria, namely being in a state of muscle injury, fan ligament joints.

The sampling technique used is the incidental sampling technique, also known as convenience sampling, is a sampling method in which the researcher selects subjects or sample units based on availability or ease of access. The sample size obtained was 225 laundry workers as research subjects.

This research data is in the form of primary data collected using the Nordic Body Map questionnaire to measure complaints of musculoskeletal disorders (Kuorinka *et al*., 1987). In addition, demographic data taken were Age, Gender, nutritional status, Education Level, Marital Status, Work Experience, and Work Duration.

Statistical data analysis using SPSS v.25 for MacOS software and presented in the form of narratives, graphs and tables to describe the characteristics of subjects, the distribution of MSDs risk levels, as well as the distribution of MSDs risk levels in each characteristic of age, gender, nutritional status, work experience and work duration.

This research has been approved by the Bali International University Research Ethics Commission with permit number 01.036/UNBI/EC/IV/2022, dated 09 January 2023.

RESULTS AND DISCUSSION

The results of data collection in this study have been organized into two groups, namely demographic data and skeletal muscle complaints data. The participants in this study consisted of 225 laundry workers. Data on the distribution of subject characteristics are presented in table 1 below.

Based on Table 1 below, it can be seen that the majority of respondents are relatively young individuals, with 38.7% of them being in the age group of 19 to 27 years old and 29.8% being between 28 to 36 years old. This may reflect the higher interest of the young in participating in this study. In addition, gender also played an important role in this sample, with females dominating the respondent population at 69.9%. Regarding physical health, the majority of respondents had a body mass index (BMI) within the normal range (75.6%), indicating a good level of health in this sample. In terms of education, most of the respondents (80.9%) had a high school or vocational school level of education, which may have resulted in a better understanding of the issues under study. Meanwhile, in terms of marital status, there was a fairly balanced difference between married (53.8%) and unmarried (46.2%) respondents.

Furthermore, the majority of respondents had recent work experience (79.1%), and most of them worked less than 8 hours a day (88.9%). This shows that most of the respondents in this sample are young, highly educated individuals, with the majority working for a normal amount of time. All these factors may influence their views and habits related to the issue under

study.

Table 1
Distribution of Respondent's Characteristics

Sosio-Demographic Variable	Subcategory	Number (n) N=Total 225	Percentage (%)
Age (year)	19-27	87	38,7
	28-36	67	29,8
	37-45	40	17,8
	46-54	19	8,4
	>54	12	5,3
Gender	Female	155	31,1
	Male	70	69,9
BMI (Kg/m2)	Very Underweight: <17	7	3,1
	Underweight: 17 -<18,5	13	5,8
	Normal 18,5 - 25,0	170	75,6
	Overweight >25 - 27	35	15,6
	Obese >27	0	0,0
Education Level	Primary School	7	3,1
	Junior High School	11	4,9
	High School / Vocational School	182	80,9
	Bachelor	25	11,1
Marital	Unmarried	104	46,2
	Married	121	53,8
Work Experience	New	178	79,1
	Old	47	20,9
Work Duration	< 8hr	200	88,9
	> 8hr	25	11,1

The results of data collection on musculoskeletal complaints in 225 laundry workers using the Nordic Body Map questionnaire with 4 Likert Scales, namely Score 1 (No Pain), Score 2 (Rather Pain), Score 3 (Pain), Score 4 (Very Pain). Data collection was carried out on 28 body areas and more details are presented in Table 2.

Table 2
Prevalence of Work-related Musculoskeletal Disorders of laundry worker

Body Areas	Complaints			
	No Pain (%)	Rather Pain (%)	Pain (%)	Very Pain (%)
Upper Neck	21,8	59,1	14,2	4,9
Lower Neck	38,2	41,3	16,0	4,4
Left Shoulder	36	40,9	16,0	7,1
Right Shoulder	21,3	44,9	24,0	9,2
Left Upper Arm	40	37,3	17,8	4,9
Back	19,6	40,9	29,3	10,2
Right Upper Arm	20	20,4	32,0	7,6
Waist	19,6	35,1	37,3	7,6
Hip	37,3	39,1	18,7	4,9
Buttocks	58,7	27,6	9,8	4
Left Elbow	71,6	22,2	2,7	3,6
Right Elbow	54,7	27,1	13,3	4,9
Left Forearm	48	36,4	11,6	4

Right Forearm	29,3	47,1	14,2	9,3
Left Wrist	46,2	35,1	15,6	3,1
Right Wrist	25,8	42,7	26,2	5,3
Left Hand	40,9	39,1	15,1	4,9
Right Hand	24,9	41,8	23,6	9,8
Left Thigh	54,2	31,6	12,9	1,3
Right Thigh	47,6	41,3	8,0	3,1
Left Knee	58,2	29,3	7,6	4,9
Right Knee	51,6	36,9	7,1	4,4
Left Leg	37,8	36,4	18,7	7,1
Right Leg	26,2	40,9	24,9	8
Left Ankle	49,3	31,1	16,9	2,7
Right Ankle	42,2	39,1	15,1	3,6
Left Foot	47,6	24,4	25,3	2,7
Right Foot	42,2	29,8	24,9	3,1

Based on the data results in Table 2. shows the prevalence of work-related musculoskeletal disorders in laundry workers. The prevalence of MSDs complaints in 28 body areas based on the level of complaints felt, where the highest prevalence of complaints felt no pain in the left elbow body part by 71.6%, complaints felt somewhat painful in the right forearm by 47.1%, complaints of pain felt at the waist by 37.3%, while very painful felt at the back by 10.2%. Meanwhile, to clarify the prevalence of musculoskeletal complaints, a visualisation is presented in Figure 1.
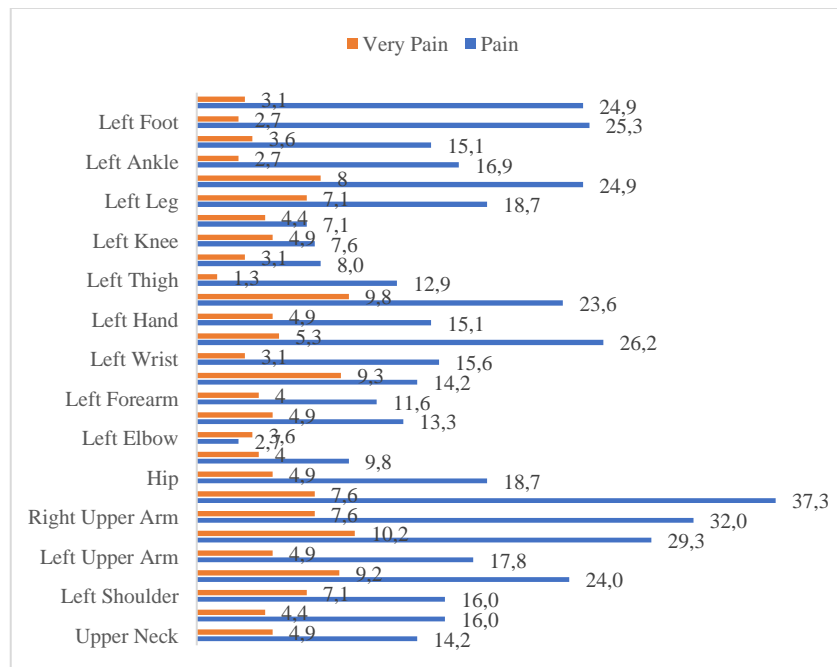

Figure 1. Prevalence of Work-related Musculoskeletal Disorders

The results of the chi-square test between the characteristics of respondents and complaints of musculoskeletal disorders in laundry workers can be seen in Table 3.

Table 3
Chi-Square Test Results Characteristics of Respondents with MSDs

Characteristics	No MSDs		MSDs		Chi Statistics
	n	(%)	n	(%)	
Age					
19-27	58	66,7	29	33,3	
28-36	40	59,7	27	40,3	
37-45	18	45	22	55	0,018*
46-54	6	31,6	13	68,4	
>54	5	41,7	7	58,3	
Gender					
Female	52	74,3	18	25,7	0,001*
Male	75	48,4	80	51,6	
BMI (Kg/m2)					
Very Underweight <17	7	100	0	0	
Underweight: 17 -<18,5	10	76,9	3	23,1	
Normal 18,5 - 25,0	90	52,9	80	47,1	0,037*
Overweight >25 - 27	20	57,1	15	42,9	
Obese >27	0	0	0	0	
Education Level					
Elementary	5	71,4	2	28,6	
Primary	2	18,2	9	81,8	0,059
High School	105	57,7	77	42,3	
Bachelor's	15	60	10	40	
Marital					
Single	73	70,2	31	29,8	0,001*
Married	54	44,6	67	55,4	
Work Experience					
Not at risk	111	62,3	67	37,7	0,001*
At risk	16	34,1	31	65,9	
Work Duration					
< 8 hr	117	58,5	83	41,5	0,090
> 8 hr	10	40	15	60	

Based on Table 3 above shows the relationship between the characteristics of respondents including age, gender, nutritional status, education level, marital status, work experience, and work duration with complaints of musculoskeletal disorders in laundry workers.

In this study, it is known that the age category is dominated by young age >19 years as many as 87 respondents. Based on age characteristics, it shows that age has a significant relationship with the incidence of musculoskeletal complaints in laundry workers with a significance value of 0.018. According to Thetkathuek *et al.* (2016) in the age range of 35-55 years, the problem of pain caused by musculoskeletal disorders increases to 70%. Meanwhile, according to research conducted by Shobur, *et al.* (2019), one of the things that affect muscle work is age, because the increasing age of a person in this condition reduces muscle strength, this shows that there is a relationship between age and musculoskeletal complaints with workers aged ≥30 years because they are at risk of 4.4 times experiencing high levels of musculoskeletal complaints compared to workers aged <30 years.

According to gender in This study, it was dominated by respondents with female gender as many as 155 respondents than male respondents. Based on the results of the chi-square test, there is a significant relationship between gender and complaints of musculoskeletal disorders with a significance value of 0.001. Gender is a factor related to muscle endurance between

women and men. Related to that, gender is related to complaints of musculoskeletal disorders this is because physiologically the ability of male muscles is stronger than the ability of female muscles. Women's muscle ability is only about two-thirds of men's muscle strength, so women's muscle capacity is smaller when compared to men's muscle capacity (Tarwaka *et al*., 2004).

Based on the nutritional status in this study, the majority were in the normal category as many as 170 respondents. Based on the results of the chi-square test, there is a significant relationship between nutritional status and complaints of musculoskeletal disorders with a significance value of 0.037. Similar results were also reported by Purnawijaya *et al*. (2019) about the relationship between body mass index and complaints of musculoskeletal disorders and their distribution using the Nordic Body Map in Satria Nusantara gymnastics members which showed a relationship between Body Mass Index and musculoskeletal disorders (Tandirerung *et al*., 2019). Excess body mass index tends to lead to increased mechanical stress on the body structures responsible for supporting body mass. When viewed from biomedical dynamics, the greatest pressure will be received by the body parts and joints that support the human body, especially the lower extremities and back (Tandirerung *et al*., 2019).

The period of employment is the time when individuals work, which is calculated from the start of employment until the time of the study. This working period shows the length of time individuals are exposed to the workplace until this research is conducted. The longer the working time, the longer the worker is exposed to the workplace which can affect the occurrence of increased musculoskeletal complaints (To *et al*., 2020) Physical work that is carried out continuously and repeatedly over a long period of time will affect the mechanisms in the body (circulatory, digestive, muscular, nervous, and respiratory systems) (Wulan and Hilal, 2020).

The results of the chi-square statistical test show a relationship between work experience or tenure and musculoskeletal complaints. This is because the longer the working period, the longer the exposure in the workplace which results in a higher risk of musculoskeletal complaints (Saputra, 2020). Periods of working can affect workers both positively and negatively. The positive influence is seen in the increase in experience and expertise in accordance with the length of work. Conversely, a long working period will also have a negative effect because it causes fatigue and boredom.

Based on the results of the study, it is known that laundry workers have a long working period of more than 2 years and a new working period of less than 2 years. The data shows that 65.9% of laundry workers with a working period of >2 years are at risk of musculoskeletal complaints. The longer laundry workers work with non-ergonomic work attitudes, the higher the risk of musculoskeletal complaints. This is because musculoskeletal complaints will increase as work experience increases (Purwati *et al*., 2023). Previous research also found that the majority of respondents with a working period of >2 years had a risk of experiencing musculoskeletal complaints. A long working period will provide accumulated work pressures so that over a long time it will result in clinical or chronic fatigue (To *et al*., 2020).

Work duration is the amount of time spent by workers to perform work activities in one day or one week. Work duration can affect musculoskeletal complaints, which are pain or discomfort in the human skeletal and muscular systems (Mourad, 2021).

The results of the chi-square statistical test showed no relationship between work duration and musculoskeletal complaints. This is because the workers are still within the normal working duration range of around 88.8% working <8 hours. Prolonged work duration can cause static loads on muscles and joints, which can lead to fatigue, strain, and inflammation. Long work duration can also reduce rest and muscle recovery time, which can worsen musculoskeletal conditions. Work duration that is too long can increase the risk of musculoskeletal disorders, especially in body parts that are often used in work, such as the

neck, shoulders, back, hands, and feet. The results of research conducted by Zulhijjah found that there was no significant relationship between work duration (p = 0.250) and musculoskeletal complaints. Work duration is not associated with musculoskeletal complaints because work duration does not affect the physical burden experienced by workers. The physical burden experienced by workers is more influenced by other factors such as length of service, workload, and work posture (Zulhijjah, 2021). The duration of working time can lead to a decrease in muscle and joint function. High workloads can cause muscle and joint fatigue. Unergonomic work postures can cause muscle and joint strain. Therefore, work duration is not a major risk factor for musculoskeletal complaints in PT PLN (Persero) Jeneponto Transmission Service Unit and Substation workers (Zulhijjah, 2021).

CONCLUSION

Based on the results of research on the frequency of musculoskeletal complaints among laundry workers in North Sulawesi, it was concluded that in this study the majority of respondents' characteristics were based on age 19-29 years (38.7%), female gender 155 workers (69.9%), nutritional status in the normal category as many as 170 workers (75.6%), high school education level as many as 182 workers (80.9%), marital status as many as 121 workers (53.8%), work experience <2 years as many as 178 workers (79.1%), and work duration <8 hours as many as 200 workers (88.9%). The prevalence of musculoskeletal complaints in 28 body parts was felt to be very painful with a percentage of 10.2% felt in the back, 37.3% felt pain in the waist, 47.1% felt somewhat pain in the right forearm, and 71.6% felt no pain in the left elbow. Based on the chi-square statistical test, there was a relationship between age, gender, nutritional status, and work experience with musculoskeletal complaints (p<0.05). While there is no relationship between work duration and education level with musculoskeletal complaints (p>0.05). Therefore, appropriate interventions need to be made to improve working conditions, protect workers' health, and minimize the risk of work-related musculoskeletal disorders in the laundry industry.

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