

Ergonomic working positions with musculoskeletal disorders and work fatigue in lifting workers at a furniture company

Posisi Kerja Ergonomis dengan Gangguan Muskuloskeletal dan Kelelahan Kerja pada Pekerja Angkat Berat di Perusahaan Furniture

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ABSTRACT

Background: Furniture workers who lift and carry heavy loads face various ergonomic risks that impact their work performance and health. Field observations indicate that manual material handling is carried out conventionally with heavy and large loads without the use of assistive devices. This results in workers working in non-ergonomic positions. In addition, the high frequency of repetitive movements and the lack of education on correct lifting techniques increase the risk of fatigue and musculoskeletal disorders.

Objective: This study aims to analyze the differences in work fatigue and musculoskeletal disorders in the ergonomic work positions of furniture workers.

Methods: The study subjects were 60 male workers. Work fatigue was measured using a reaction time meter with millimeter (mm) units and a questionnaire. This study used an experimental design with a randomized controlled trial method. Data collection on musculoskeletal disorders used the Nordic Body Map (NBM) questionnaire.

Results: Comparison of pre-employment and post-employment scores in the treatment group showed that the average value decreased from 719.63 mm before work to 235.07 mm after work. The average musculoskeletal disorders in the control group increased before and after work from 30.30 to 33.30 ($p=0.001$). These results indicate that ergonomic work position interventions can reduce fatigue and musculoskeletal disorders in lifters.

Conclusion: Therefore, companies need to implement comprehensive work ergonomic standards including manual handling technique training for all workers, provision of lifting aids such as trolleys or hand trucks, and worker health monitoring as a preventive measure against work fatigue and musculoskeletal disorders.

Keywords: ergonomics, musculoskeletal disorders, work fatigue, work position

ABSTRAK

Latar Belakang: Pekerja angkat angkut di perusahaan furniture menghadapi berbagai risiko ergonomis yang berdampak pada performa kerja dan kesehatan pekerja. Observasi lapangan menunjukkan bahwa penanganan manual material handling dilakukan secara konvensional dengan beban yang berat dan berukuran besar tanpa menggunakan alat bantu. Hal ini mengakibatkan pekerja bekerja dengan posisi yang tidak ergonomis. Selain itu, tingginya frekuensi gerakan yang berulang serta kurangnya edukasi teknik mengangkat yang benar meningkatkan risiko kelelahan dan gangguan muskuloskeletal.

Tujuan: Penelitian bertujuan untuk menganalisis perbedaan kelelahan kerja dan gangguan muskuloskeletal pada posisi kerja ergonomis pekerja perusahaan furniture.

Metode: Subjek penelitian adalah 60 pekerja laki-laki. Pengukuran kelelahan kerja menggunakan alat reaction timer dengan satuan milimeter (mm) dan kuesioner. Penelitian ini menggunakan desain eksperimental dengan metode uji coba terkontrol secara acak. Pengumpulan data gangguan muskuloskeletal dengan kuesioner Nordic Body Map (NBM).

Hasil: Perbandingan skor pra-kerja dan pasca-kerja pada kelompok perlakuan menunjukkan bahwa nilai rata-rata menurun dari 719,63 mm sebelum kerja menjadi 235,07 mm setelah kerja. Rata-rata gangguan muskuloskeletal pada kelompok kontrol meningkat sebelum dan sesudah bekerja dari 30,30 menjadi 33,30 ($p=0,001$). Hasil ini menunjukkan bahwa intervensi posisi kerja ergonomis dapat mengurangi kelelahan dan gangguan muskuloskeletal pada pekerja angkat angkut.

Kesimpulan: Oleh karena itu perusahaan perlu menerapkan standar kerja ergonomis secara menyeluruh termasuk pelatihan teknik manual handling pada semua pekerja, penyediaan alat bantu angkat seperti trolley atau handtruck serta monitroning kesehatan pekerja sebagai upaya pencegahan terhadap kelelahan kerja dan gangguan muskuloskeletal.

Kata kunci: ergonomi, gangguan muskuloskeletal, kelelahan kerja, posisi kerja

INTRODUCTION

Manual material handling workers, such as furniture industry lifters, face musculoskeletal disorders and fatigue as their most common occupational health problems [1], [2]. Thirty percent of workplace accidents result from manual material handling activities [3]. These activities include pushing, lifting, carrying, pulling, holding, and moving [4]. Poor working conditions, non-ergonomic tools, and awkward work postures heighten safety hazards in this work [5]. Heavy lifting, static and awkward postures, and repetitive movements are the principal contributors to fatigue in the furniture industry [6].

Based on observations made by researchers (2021) conducted by researchers at company X, a furniture company, workers lift and carry loads exceeding 25 kg without aids and use non-ergonomic work positions. Excessive lifting loads and non-ergonomic work positions can increase the risk of work fatigue and musculoskeletal disorders in workers. According to the World Health Organization (WHO), work-related musculoskeletal disorders (WMSDs) are a cause of loss of work productivity and decreased quality of life experienced by workers in various industrial sectors [7]. Factors causing work fatigue include workload, work environment, type of work, health history, individual factors, worker psychology, age, work duration, work climate, and work position [7]. Long working hours have a significant influence in increasing the risk of musculoskeletal disorders in workers, especially in physical work such as lifting, manufacturing and construction. Working more than 8-10 hours per day can increase the risk of MSDs and increase complaints in the neck, lower back, shoulders and upper extremities [8]. Musculoskeletal disorders in lifting workers begin to appear within 1-4 days, depending on the load and body posture when carrying out work activities [9].

Work fatigue can be caused by monotonous work. In furniture manufacturing, workers perform repetitive movements continuously for eight hours at a time. Workplace fatigue can lead to accidents, decreased productivity, and memory impairment, which can affect decision-making [10]. Workers who carry out repetitive and monotonous work activities can experience a decline in performance capabilities and cognitive functions consisting of aspects of attention, memory and decision-making abilities as the workload increases [11], [12],[13]. Heavy physical workloads can cause work fatigue and reduce productivity in manufacturing workers [14]. Work postures are needed to reduce work fatigue and musculoskeletal disorders [15]. Although many research results confirm the importance of ergonomic work positions to reduce work fatigue and musculoskeletal disorders, most of these research results still focus on office workers, health workers or manufacturing workers who work in stable working conditions over time so that the physical workload is more easily predicted [16]–[19]. Research on manual material handling jobs with high physical loads, high movement frequencies, and heavy work demands over relatively

long periods of time, such as lifting workers who face heavy loads, repetitive movements, and awkward postures, is still very limited. This gap indicates the need for this study to analyze the differences in work fatigue and musculoskeletal disorders in ergonomic work positions of furniture company workers. The intervention carried out in the experimental group was the ergonomic/correct lifting work position. The contribution to the science of Occupational Safety and Health (K3), especially ergonomics, is the implementation of work positions/postures in lifting work activities. The expected benefits for workers are to protect workers from complaints or disturbances of work accidents and occupational diseases caused by work positions/postures in lifting goods, such as work fatigue, injuries due to lifting loads and musculoskeletal disorders. The benefits for the company are implementing K3 in the industry, thereby preventing workers from work-related diseases and accidents, and maintaining worker productivity.

METHODS

Study design

The study employed an experimental design using a randomized controlled trial (RCT). The study was conducted at Company X in Mempawah Regency, West Kalimantan Province, over a six-month period from June to December 2020.

Data source and sampling procedure

Participants were recruited using purposive sampling based on inclusion and exclusion criteria. A total of 60 male workers were included in the study and were randomly allocated into an intervention group (n = 30) and a control group (n = 30). The sample consisted of 60 male workers. 30 male workers served as the control group, and 30 other male workers served as the intervention group. The sample inclusion criteria were: workers involved in lifting and carrying, aged 20-55 years, without chronic or degenerative diseases, and willing to participate in the study by complying with the research procedures. The exclusion criteria included female workers and workers who did not perform lifting and carrying work.

Measurement and instruments

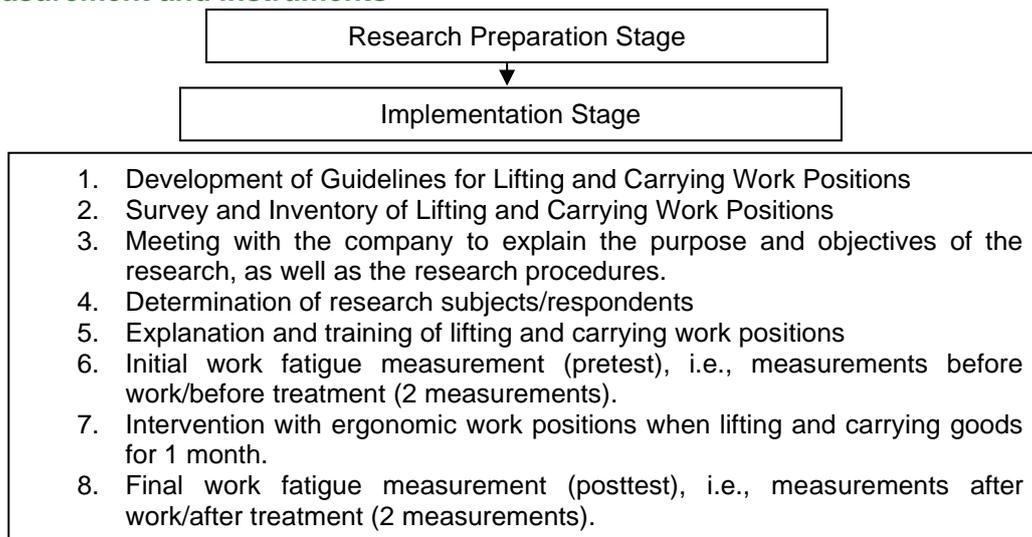


Figure 1. Research Flow

The treatment group received an intervention involving ergonomic work positions during lifting and carrying tasks. The control group performed lifting and carrying work in their usual work positions. The experiment was conducted over a period of one month.

The independent variable in this study was the lifting and carrying work position, while the dependent variables were musculoskeletal disorders and work fatigue.

Data collection

Data were collected through structured interviews using a questionnaire comprising worker characteristics, including age, education, and length of service. Work position data were obtained through observation using a checklist. Work fatigue was measured using a L-77 Model Reaction Timer manufactured by Lakassidaya, a standardized tool used by the West Kalimantan Province Occupational Safety and Health Center. The reaction timer is calibrated periodically to ensure its validity and reliability. The equipment is calibrated by PT.Teknora Sukses Cemerlang, a calibration laboratory company that has been certified by the KAN Agency and SNI ISO/IEC 17025:2017. The reaction timer operates by measuring the time elapsed between sound or light stimuli, with the results displayed digitally. Fatigue is measured in millimeters (mm).

Musculoskeletal disorders were assessed using the Nordic Musculoskeletal Questionnaire, also known as the Nordic Body Map. Questionnaires were administered to assess 27 body parts related to work-related musculoskeletal disorders. Workers who were respondents in the study were asked to provide an assessment of the parts of the body that felt painful during work activities according to a predetermined Likert scale.

Respondents were then asked to fill out the Nordic Body Map form according to the level of complaints they felt. Based on the data collected through the Nordic Body Map questionnaire, the results were then scored against workers using a predetermined Likert scale. The scale is in the form of information written in the questionnaire, namely the measurement scale used consisted of four response options: no complaints, some soreness/pain but not too much after a short rest, some soreness/pain but painful after resting and sleeping the next day, and some soreness/pain that is very painful after resting and sleeping [20].

No. Kode Responden

**KUESIONER KELUHAN MUSKULOSKELETAL
 DENGAN NORDIC BODY MAP (NBM)**

I. IDENTITAS RESPONDEN

1. Nama :
 2. Umur /Tgl lahir :
 3. Pendidikan :
 4. Status : a.kawin b. belum kawin
 5. Lama Kerja : Tahun..... bulan
 6. Jam Kerja sehari : Jam (dari jam..... s/d jam)
 7. Lama Kerja di perusahaan lain :tahun.....bulan.

II. KUESIONER NORDIC BODY MAP

NO.	PERTANYAAN	SKOR			
		1	2	3	4
0.	Sakit/kaku di leher bagian atas				
1.	Sakit/kaku di leher bagian bawah				
2.	Sakit di bahu kiri				
3.	Sakit di bahu kanan				
4.	Sakit pada lengan atas kiri				
5.	Sakit di pundung				
6.	Sakit pada lengan atas kanan				
7.	Sakit pada pinggang				
8.	Sakit pada bawah pinggang				
9.	Sakit pada bokong				
10.	Sakit pada siku kiri				
11.	Sakit pada siku kanan				
12.	Sakit pada lengan bawah kiri				
13.	Sakit pada lengan bawah kanan				
14.	Sakit pada pergelangan tangan kiri				
15.	Sakit pada pergelangan tangan kanan				
16.	Sakit pada Tangan Kiri				
17.	Sakit pada tangan kanan				
18.	Sakit pada paha kiri				
19.	Sakit pada paha kanan				
20.	Sakit pada lutut kiri				
21.	Sakit pada lutut kanan				
22.	Sakit pada betis kiri				
23.	Sakit pada betis kanan				
24.	Sakit pada pergelangan kaki kiri				
25.	Sakit pada pergelangan kaki kanan				
26.	Sakit pada telapak kaki kiri				
27.	Sakit pada telapak kaki kanan				
JUMLAH SKOR					

KETERANGAN SKOR :
 1.Tidak Sakit : Tidak ada keluhan yang dirasakan
 2.Agak Sakit : Ada rasa pegal/nyeri tapi tidak terlalu sakit setelah istirahat sebentar rasa pegal/nyeri hilang
 3.Sakit : Ada rasa pegal/nyeri terasa sakit setelah istirahat tidur besok hari rasa pegal/nyeri hilang
 4.Sakit Sekali : Ada rasa pegal/nyeri terasa sakit sekali setelah istirahat tidur

Figure 2. Nordic Body Map Questionnaire

Ethical considerations

This research was conducted in accordance with the Helsinki Declaration guidelines and was approved by the Ethics Committee of the Pontianak Ministry of Health Polytechnic (No. 035/KEPK-PK.PKP/II/2020). Written consent was obtained from all participants who participated as study respondents.

Data analysis

The research data processing was conducted through descriptive analysis aimed at observing the distribution of characteristics of the dependent and independent variables. Inferential analysis used the T-test with a significance level ($\alpha = 0.05$); $p < 0.05$, to analyze the differences in fatigue and musculoskeletal disorders between the control group (normal work position) and the treatment group (ergonomic work position) [21].

RESULTS

Based on Table 1, most of the respondents of the furniture company's lifters were aged <40 years in the control group (76,7%) and the treatment group (80%). Based on the last education, most of the respondents of the furniture company's lifters had secondary education, both in the control group (53,3%) and the treatment group (63,3%). The work period of most respondents in the control group (96,7%) and the treatment group (83,3%) was more than 5 years.

Table 1. Frequency Distribution of Respondents of Lifting Workers in Furniture Companies

Variabel	Category	Control Group		Treatment Group	
		n	%	n	%
Age	< 40 Years	23	76.7	24	80
	≥ 40 Years	7	23.3	6	20
Education	Primary education	13	43.3	11	36.7
	Secondary education	16	53.3	19	63.3
	Higher education	1	3.3	0	0
Length of Work	<5 years	1	3.3	5	16.7
	≥ 5 years	29	96.7	25	83.3

Table 2. Analysis of Work Fatigue Before and After Work in Lifting Workers at a Furniture Company

Work Fatigue	Category	n	Mean±sd	CI = 95%		p-value ^a
				min	max	
Control Group	Pre test	30	637,4 mm ±109,34 mm	457	928	0,000
	Post test	30	298,33 mm ±73,77 mm	195	465	
Treatment Group	Pre test	30	719,63 mm ±195,69 mm	485	1255	0,000
	Post test	30	235,07 mm ±42,21 mm	149	305	

^a t-test with a significance level ($\alpha = 0,05$); $p < 0,05$

Based on Table 2, the mean pre-work fatigue score for the control group was 637.4, and post-work scores were 298,33 mm, with a p-value of 0,000. This indicates a significant difference in fatigue between pre-work and post-work fatigue analysis. The comparison between pre-work and post-work scores for the treatment group, with a mean of 719,63 mm before work and 235,07 mm after work, and a p-value of 0,000, indicates a significant difference in fatigue levels between pre-work and post-work.

Based on Table 3, in the control group, the mean musculoskeletal disorder score increased from 30,30 mm before work to 33,30 mm after work, with a p-value of 0,001. In contrast to the control group, the treatment group showed a decrease in scores from 30,73 mm to 28,63 mm ($p = 0,043$).

Table 3. Analysis of Musculoskeletal Disorders Before and After Work in Lifting Workers at a Furniture Company

Musculoskeletal Disorders	Category	n	Mean±SD	CI = 95%		p-value ^a
				min	Max	
Control Group	Pre test	30	30,30 mm ±3,29 mm	21	37	0,001
	Post test	30	33,3 mm +4,76 mm	29	51	
Treatment Group	Pre test	30	30,73 mm ±4,1 mm	27	41	0,043
	Post test	30	28,63 mm +2,65 mm	24	35	

^a *t*-test with a significance level ($\alpha = 0,05$); $p < 0,05$

Table 4. Analysis of Differences in the Reduction of Work Fatigue and Musculoskeletal Disorders in Lifting Workers at a Furniture Company

Variabel	Category	n	CI = 95%		p-value ^a
			Mean	SD	
Reduction in work fatigue	Control Group	30	298,33 mm	73,77	0,001
		30	235,07 mm	42,21	
Reduction in musculoskeletal disorders	Treatment Group	30	33,30 mm	4,76	0,000
		30	28,63 mm	2,65	

^a *t*-test with a significance level ($\alpha = 0,05$); $p < 0,05$

The results of the analysis in Table 4 indicate a significant difference in the reduction of work fatigue and musculoskeletal disorders between the control group and the treatment group following ergonomic intervention. Work fatigue in the treatment group (mean = 235,07 mm) showed a greater decrease than the control group (mean 298,33 mm) with a p value = 0,001, while musculoskeletal disorders in workers with complaint scores were higher in the treatment group (mean 28,63 mm) than the control group (33,30 mm) with $p = 0,000$.

DISCUSSION

The process of lifting and transporting activities in industrial activities is found in: 1) the production section in receiving raw materials (needs to lift and transport raw materials), 2) the production process section into semi-finished materials (also needs to lift and transport semi-finished materials), 3) in the warehouse section (needs to lift and transport finished goods to be stored in the warehouse or the production results in the warehouse are taken out to be distributed to customers. Based on the research results the more significant reduction in pre-work fatigue in the treatment group compared to the control group indicates that ergonomic interventions, namely the implementation of ergonomic work postures and education on proper lifting techniques, can reduce work fatigue. This finding aligns with research by Ardiyanti (2022) [22], which suggests that ergonomic interventions can reduce work fatigue and enhance worker productivity.

Physiologically, occupational fatigue can be caused by physical workload, activity duration, work posture, and individual capacity [5], [7], [23], [24]. Manual lifting and carrying work in the furniture industry requires intensive muscle activity. The muscles most involved are the back, shoulders, and arms [25]. This activity increases energy metabolism and causes lactic acid buildup, which triggers muscle fatigue [26]. Ergonomic interventions reduce the biomechanical load on these muscles. As a result, the onset of fatigue is slowed [27].

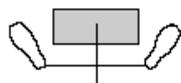
In the control group, the mean musculoskeletal disorder score increased from 30,30 before work to 33,30 after work, with a p-value of 0,001. This increase indicates that without intervention, work activities actually trigger an increase in musculoskeletal complaints. According to Yang (2022), the mechanism that increases musculoskeletal complaints is the repetitive biomechanical load on the main muscle groups (lower back, shoulders, neck, and wrists) involved in lifting and carrying activities [25]. Without

intervention, workers tend to maintain non-ergonomic postures, such as bending for long periods or lifting loads with incorrect techniques, which causes excessive stress on the musculoskeletal tissue [15].

In contrast to the control group, the treatment group showed a decrease in scores from 30.73 mm to 28.63 mm ($p = 0.043$). This decrease demonstrates that ergonomic interventions are effective in reducing musculoskeletal complaints, even if workers continue to perform the same tasks. These interventions can include adjusting work desk heights, using lifting aids, training in proper lifting techniques, or job rotation to reduce repetitive stress exposure on specific muscle groups [28].

Ergonomic interventions, including adjustments to work posture and training in correct lifting techniques, are effective in reducing mechanical loads and muscle tension that can lead to work fatigue and musculoskeletal disorders. This aligns with the literature [29], which suggests that a participatory approach incorporating physical exercise and ergonomic programs can significantly reduce the risk of musculoskeletal disorders (WMSDs). A 12-week combination of ergonomic training and physical exercise significantly reduced musculoskeletal pain in the back and waist. According to Susihono (2021) [27], long-term ergonomic interventions have been shown to significantly reduce musculoskeletal complaints and fatigue. Ergonomic interventions help modify and distribute the workload more evenly, thereby reducing the accumulation of static pressure in muscles, improving local blood flow, and reducing metabolic stress in the form of lactate accumulation and tissue acidity. Consequently, workers experienced reduced physical fatigue and decreased muscle pain intensity compared to the group that did not receive the intervention [30].

Based on the discussion above, manual material handling workers, especially those who lift and carry, are highly susceptible to fatigue due to heavy physical activity, repetitive movements, and non-ergonomic work postures. Efforts or alternatives to prevent fatigue include improving work posture and using assistive devices to reduce muscle activity and fatigue [28], [31], [32]. Regulating the work cycle can reduce muscle fatigue and increase worker productivity [33], [34]. Efforts to prevent musculoskeletal disorders in lifting workers can be done by applying ergonomic principles in daily work activities, such as ensuring a neutral posture when lifting loads [15], avoiding excessive bending [35], and using correct lifting techniques by bending the knees and keeping the load close to the body [1]. Companies also need to provide mechanical aids such as trolleys, forklifts, or conveyors to reduce excessive physical load [36]. Establishing a work schedule with adequate rest periods is important to prevent muscle fatigue, along with regular stretching or ergonomic exercise programs to increase flexibility and muscle strength [34], [37], [38]. The following are positions for lifting and carrying goods that comply with ergonomic standards :



Make sure the foot position is firm and stable.
Close your feet to the item you want to lift.



Lower your body and bend your knees.
Head position is upright. The position of the spine or waist must be straight and upright



Make sure your knees are bent when lifting objects. Raise the item to the abdominal level and lift the item slowly. If the item feels heavy, support it with your leg muscles.



When lifting, use your leg muscles as the lifting point, not your waist or back. Position the object close to or against your body. When walking and moving an object, position your arms straight down to support the load, keeping your back and neck straight.

Figure 3. Lifting position that meets ergonomic standards

Image Source: U.S Army Center for Health Promotion [39]



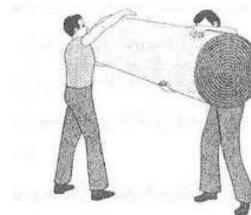
Position your body with your spine supported by your pelvis. Tilt your back slightly back. Position the weight above your chest with your arms close to your body. Your arms close to your body support the weight.



When walking and moving objects, position your hands straight down to support the load, keeping your back and neck straight.



Always use your feet to change and determine direction, not your body. Take small steps first when changing direction. Use your hips when changing direction to guide your feet in the desired direction.



To lift heavy loads correctly by bending your knees and hips or in a squatting position, keep your back straight, keep the load as close to your body as possible, when standing use the strength of your legs to push around, not your waist or bend over, ask a friend for help if the load feels too heavy to prevent back and waist injuries.

Figure 4. Ergonomic standard walking and carrying position

Image Source: Guidelines for Manual Handling at Workplace 2018 [40]

The research's strengths include identifying ergonomic and non-ergonomic work positions for lifting and carrying workers. This can serve as a reference for work positions and provide relevant solutions for lifting and carrying workers in all workplaces. This can prevent musculoskeletal disorders and work fatigue. Weaknesses (limitations) of the research include time and cost constraints, which prevented the study from exploring all variables related to musculoskeletal disorders and work fatigue. Data on musculoskeletal

disorders may be subjective because it only asked about worker complaints using the Nordic Body Map questionnaire. Research Implications: The impact or logical consequence of the research results is to contribute to management policies and standard operating procedures (SOPs) for ergonomic lifting and carrying practices.

Furthermore, the contribution to workers' practical activities in the workplace is through the implementation of ergonomic work positions for lifting and carrying. It is hoped that ergonomic lifting and carrying positions can prevent and reduce musculoskeletal disorders and work fatigue in workers. For academic researchers in the field of Occupational Safety and Health, they can conduct research on work positions in various fields of work related to fatigue and musculoskeletal. The results of the study indicate that the implementation of ergonomic work positions is very important for maintaining the physical condition of lifters in furniture companies that have work activities with high manual material handling. A significant decrease in the level of work fatigue in the treatment group indicates that improving ergonomic work postures can reduce physical loads during lifting and carrying activities. This is in line with the concept of ergonomics which explains that the application of ergonomic postures during work activities can optimize the use of muscle energy, reduce tension and increase movement efficiency. [15]. In contrast, musculoskeletal disorders in the control group increased, which means that without ergonomic intervention, repetitive physical workloads and incorrect working positions can potentially exacerbate symptoms of musculoskeletal disorders.

The control group may experience increased symptoms of musculoskeletal disorders even though fatigue decreases after work, indicating the body's mechanism to adapt to maintain work function when performing work activities with heavy physical loads, incorrect postures, and work fatigue. Overall, it can be concluded that the results of this study confirm that the application of ergonomic work positions not only has a direct effect on reducing work fatigue but also prevents symptoms of more severe musculoskeletal disorders in lifters. Therefore, ergonomic intervention is important as an essential preventive strategy to improve occupational health and safety in lifters in furniture companies and other work sectors.

CONCLUSION

Workers working in furniture companies have a high risk of developing work fatigue and musculoskeletal disorders. Based on the results of the analysis above, in the control group and the treatment group, the level of work fatigue before and after work shows a significant difference in work fatigue in the control group and the treatment group before and after work (p -value 0,000). Musculoskeletal disorders before and after work in the control group (p -value 0,001), while the treatment group (0,043), which means there is a significant difference in musculoskeletal disorders before and after work. The results of the analysis of differences in work fatigue decrease with a p -value of 0,001 and a decrease in musculoskeletal disorders with a p -value of 0,000. The application of ergonomic work positions when lifting and carrying loads is important to reduce work fatigue and musculoskeletal disorders in workers.

Suggestions that can be given related to this research are expected to further researchers to study the application of ergonomic principles in occupational safety and health, especially for workers involved in lifting and transport tasks. Furthermore, it is necessary to link it with work environment factors such as lighting, temperature, measurement conditions, disturbances and workspace design that can affect physical workload and work fatigue. Suggestions for the future, so that companies can implement ergonomics into the occupational safety and health management system, and can socialize to workers how body posture and lifting load according to standards, in addition

it is necessary to implement a program for regular worker health checks and monitoring such as regular health checks, work fatigue checks for workers to prevent and reduce the risk of musculoskeletal disorders. In its implementation, companies can make improvements to work infrastructure, layout and can provide lifting aids and provide ergonomics training to workers on an ongoing basis to create a healthy, safe and productive work environment.

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