

The effect of workplace stretching exercise to reduce musculoskeletal complaints in weavers

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Abstract

Weavers often feel musculoskeletal complaints due to the work position that is not ergonomic and is always in a static position for a long time every day. The objective study analyzed the effectiveness of physical stretching at work in reducing musculoskeletal complaints in weavers. This research was a quasi-experiment study with control group pre-test and post-test design. The samples were a total population of as many as 44 weavers (22 as the treatment group and 22 as group control. This study was conducted from October 2019 to December 2020 at Weaving Industry Center “*Tuan Kentang*” in Palembang City. Data was collected using a questionnaire be equipped Nordic Body Map. The Wilcoxon test analyzed data. The intervention was a Workplace Stretching Exercise muscle pain scale measured before and after exercise in the treatment group. The average pain level of musculoskeletal complaints in the control and treatment groups was mild to moderate. From the results of the Wilcoxon test, it appears that the value of sig (2-tailed) in the treatment group (0.005) < the value of sig (2-tailed) in the control group (0.06), so it can be stated that stretching exercises at work are carried out two times daily for one month is effective to reduce complaints of musculoskeletal pain. Workplace Stretching Exercises effectively reduce musculoskeletal complaints, especially in weavers with static work positions and working for long periods. Stretching exercises can reduce musculoskeletal complaints about traditional weavers if done regularly.

Keywords: musculoskeletal complaints; workplace stretching exercise; weavers

INTRODUCTION

Recently, economic development has been dominated by the informal sector because the informal sector is synonymous with unorganized, unregulated, unregistered, and is a place for those with low education and unable to compete for established job positions in the formal sector. The existences of the informal sectors are still an employer for the majority of the workforce in Indonesia (BPS, 2020).

Until 2019, the number of formal workers was 55,272,968, an increase of 4.1 percent from the previous year of 53,094,391 workers. In the informal sector, the number of workers in the same year was 74,093,224 people, or an increase of 0.16 percent, from the previous year (BPS, 2020). In Indonesia, business activities in the informal sector are spread across almost all regions, both in urban and rural areas, including the weaving



industry. Workers are a high-risk group for various health problems caused by the work process, work environment, and health behavior of workers.

The weaving industry is an informal sector work business that is a traditional economic activity managed by community groups. Traditional weaving is a cultural heritage that characterizes the uniqueness of each region in Indonesia, including Palembang City as a weaving-producing city known as *songket* and *tajung/blongket*. This study was focused for *tajun /blongket* weavers that use non-machine looms in Palembang City. Weaving activities are carried out in a sitting position using a chair without a backrest can be caused many complaints from weavers.

Musculoskeletal Disorders (MSDs) are the symptoms that affect the movement of the skeletal muscle system in humans. The weaving industry is an informal sector work business that is a traditional economic activity managed by community groups. Traditional weaving is a cultural heritage that characterizes the uniqueness of each region in Indonesia, including Palembang as a weaving-producing city known as *songket* and *tajung/blongket*. This study focused on *tajung/blongket* weavers using non-machine looms in Palembang City. Weaving activities are carried out in a sitting position using a chair without a backrest can be caused many complaints from weavers.

In previous studies, the weavers were felt pain, i.e., back, waist, shoulders, and hands, after weaving at Weaving Industry Centre in Palembang (Shobur, Maksuk, & Sari, 2019). Musculoskeletal Disorders were also felt by weaving workers in Denpasar, such as lower neck muscle area, right and left shoulder, and upper back (Fauziah et al., 2018). Besides, *songket* weavers have complained of low back pain and carry out their activities in a static sitting position every day at Ogan Ilir Regency and BNI 46 Village Palembang (Maksuk & Syafitri, 2021; Natosba & Jaji, 2016; Sitompul, Sitorus, & Hasyim, 2012). Complaints of shoulder pain and waist and back pain are also experienced by weavers in the weaving industry center of Palembang City (Ones, M., Sahdan, M., & Tira, 2021).

Therefore, to anticipate these complaints, prevention efforts are needed through stretching exercises. Workplace Stretching Exercise is a stretching exercise designed to be done at work to anticipate musculoskeletal complaints (Machado Júnior, Seger, Teixeira, Pereira, & Merino, 2012). Stretching also helps improve morale, blood circulation, physical function, and muscle flexibility and reduces the risk of injury and musculoskeletal complaints (OSHC, 2015). Stretching Exercise is an effective strategy to prevent and rehabilitate musculoskeletal complaints such as the neck, shoulder, and lower back pain (Van Eerd et al., 2016). An unergonomic sitting position caused musculoskeletal complaints in traditional weavers for a long time (Maksuk, M., Shobur, S., & Habibi, 2021; Yosineba, Bahar, & Adnindya, 2019).

Giving stretching exercises at work effectively reduces pain due to Musculoskeletal Disorders (MSDs) (Priyoto, 2019). Stretching exercises can reduce discomfort/pain and increase range of motion (ROM) (Gasibat, Simbak, Aziz, Petridis, & Tróznai, 2017). Stretching exercises in the workplace also reduce fatigue (Dahlan, 2019; Wahyu et al., 2020) and decrease musculoskeletal complaints and fatigue in workers (Suwartini, Tirtayasa, & Adiputra, 2020). Stretching exercises that are done regularly can also reduce musculoskeletal complaints in batik workers in Sokaraja (Ariska, 2018).

Based on a preliminary study at the Weaving Industry Center "*Tuan Kentang*," Palembang, the weavers are working with chairs without a backrest, in a bent position,

repeated hand movements, and have been doing the job for a long time. Besides, the equipment used for weaving is not ergonomically designed and not adjusted to the anthropometry of the weavers, so weavers have to adjust to these tools. The weavers have been working in a non-ergonomic and static position for a long time, so they were felt musculoskeletal complaints. They also never did stretching at work and checked on their health condition.

Facts in the field, especially in the traditional weaving industry, it is infrequent to find a habit of stretching at work, including in the weaving industry center of Palembang City. Occupational safety and health culture are still limited to the formal sector and have not become a culture in the informal sector, including the weaving industry. Workplace stretching exercises are exercises that are cultivated by the Ministry of Health as health promotion in the workplace that must be followed by all workers in the formal and informal sectors.

Although this workplace stretching exercise has been carried out in several other industries, for traditional weavers, especially *tajung/blongket* weaving, the data obtained was limited to information about musculoskeletal complaints. Therefore, the objective of this study was to analyze the effectiveness of physical stretching at work in reducing musculoskeletal complaints in weavers.

RESEARCH METHODS

This research was a quasi-experiment study with control group pretest and post-test design. The sample is a total population of 44 weavers consisting of 22 treatment groups and 22 control groups. This research was conducted from October 2019 to January 2020 at Weaving Industry Center “*Tuan Kentang*” in Palembang City. Data of musculoskeletal complaints were collected using a questionnaire and checklist Nordic Body Map, pain scale assessment using a numerical rating scale. Data were analyzed by univariate and bivariate using the Wilcoxon test.

The intervention was carried out in two groups: the control group was not given stretching exercise treatment, while the treatment group was given stretching exercise. Workplace Stretching Exercises were given to the treatment group, namely traditional weavers. The step workplace stretching exercise, i.e., introduction to the Workplace Stretching Exercise (WSE) was carried out right after the pre-test to the weavers for 10-15 minutes with a focus movement on the neck, face, shoulders, arms, hands, back, and legs, each movement was held for 10 seconds to feel a pull on focused muscles and then repeated 3-5 times for each movement. Furthermore, stretching exercises were carried out in a seat and applied independently by all weavers every day at 10.00 AM and 03.00 PM for four weeks. Workplace stretching exercises were under the supervision of the group leader and the researcher.

In the post-test, musculoskeletal complaints were measured using the Nordic Body Map (NBM), the same as during the pre-test. The muscle pain scale was measured after the intervention period ended. Furthermore, the data were tested for normality using Shapiro Wilk. Because the data distribution was not expected, the Wilcoxon test tested the statistics.

RESULTS AND DISCUSSION

The subjects of this study were weavers weaving industry centers in *Tuan Kentang* Palembang with the inclusion criteria, i.e., using non-machine looms, characteristics of the subjects based on age, length of working, the period of work, gender, and Musculoskeletal Complaints. Characteristics of the Traditional Weavers and Musculoskeletal Complaints were presented in Table 1 below:

Table 1. Characteristics of Respondents in Control Group and Treatment Group of Traditional Weavers

Variables	Control Group (n=22)			Treatment Group (n=22)		
	Mean±SD	Median	Min-Max	Mean±SD	Median	Min-Max
Age (years)	39.59±16.721	43.5	16-65	40.41±17.098	43.5	15-60
Length of period (hours/day)	7.5±1.114	8	6-9	7.5±1.14	8	6-9
Period of working (years)	9.97±9.64	6.5	2-30	10.091±9.54	6.5	5-29
Gender:						
1. Male	14 (63.6%)			12 (54.5%)		
2. Female	8 (36.4%)			10 (46.50%)		

Based on Table 1, the average age was 39.59 years, the length of the period about 7.5 hours/day, a period of working was 9.97 years in the control group, and in the treatment group, the average age was 40.41 years, the length of the period was 7.5 hours/day and period of working was ten years. The gender of workers was men more than women, and most of the musculoskeletal complaints were low back pain.

Table 2. Characteristics of Respondents Based on Pain Levels of Musculoskeletal Complaints in Traditional Weavers (Pre-test)

Musculoskeletal Complaints Pain	Control Group		Treatment Group	
	n	Percentage (%)	n	Percentage (%)
1. Mild Pain	13	59	10	45.45
2. Moderate Pain	8	36	12	54.54
3. Severe Pain	1	5	0	0
Total	22	100	22	100

The pain level of musculoskeletal complaints in the control and treatment groups was mild to severe, and the majority were on a mild scale. While in the treatment group, most pain scales were mild to moderate.

Table 3. Characteristics of Respondents Based on Pain Levels of Musculoskeletal Complaints in Traditional Weavers (Pre-test)

Musculoskeletal Complaints Pain	Control Group		Treatment Group	
	n	Percentage (%)	n	Percentage (%)
1. Mild Pain	9	40.9	16	72.72
2. Moderate Pain	12	54.54	5	22.28
3. Severe Pain	1	4.56	0	
Total	22	100	22	100

Before bivariate analysis, the data normality test was carried out by Shapiro Wilk because the number of samples was less than 50 weavers. The results of the normality

test showed that the data distribution of musculoskeletal complaints before and after workplace stretching exercises was not expected. The results of bivariate analysis using the Wilcoxon test were presented in Table 4 below:

Table 4. The Effectiveness of Stretching Exercises at Work on Musculoskeletal Disorders in The Treatment Group and The Control Group (n=44)

	Musculoskeletal Pain Complaints Group Control (Pretest-Postest) (n=22)	Musculoskeletal Pain Complaints Treatment Group (Pretest-Postest) (n=22)
Z	-3.464	-3.769
Asymp. Sig. (2-tailed)	0.06	0.005

From the results of the Wilcoxon test, it appears that the value of sig (2-tailed) in the treatment group (0.005) < the value of sig (2-tailed) in the control group (0.06), so it can be stated that stretching exercises at work are carried out two times daily for one month is effective to reduce complaints of musculoskeletal pain.

In general, musculoskeletal complaints are felt by weavers, namely complaints of pain in the neck, shoulders, back, and hips. This condition is caused by weavers working in a static position and continuing every day for about 8 hours/day with an average working period of 7 years. Musculoskeletal pain is felt by weavers with different pain intensities, from mild to severe pain, but weavers can still carry out weaving activities. Its condition can induce muscles that receive static loads repeatedly and for a long time, causing complaints such as damage to joints, ligaments, and tendons (Putri & Tarwaka, 2017).

In this study, the age group who felt musculoskeletal complaints was in the age range of 25 - 56 years. In general, musculoskeletal complaints begin to be felt at the working age, namely 25-65 years, where the first complaints are felt at the age of 35 years, and complaints continue to increase with age.

The working period was also one of the causes of musculoskeletal complaints in traditional weavers; it was due to the non-ergonomic work position for a long time. The weaving workers of sarung Pemalang with a working period of more than four years have a risk of musculoskeletal disorders 2.775 times greater than workers with a working period of ≤ four years (Koesyanto, 2013). Working period > 5 years was more risk of musculoskeletal complaints than five years for lurik weaving workers in Bantul (Putri & Tarwaka, 2017). The workers of batik maker also were felt musculoskeletal complaints with a period of working more than five years in Griloyo Bantul (Sari, R. O., & Rifai, 2019). According to a study on weaving workers at TuanKentang Palembang, there was a significant relationship between the working period and Musculoskeletal Disorders (MSDs). In contrast, a working period of ≥ 5 years had 6,708 times more risk than <5 years (Shobur et al., 2019).

However, carpet weaving craftsmen in Iran stated that age, gender, and tenure did not affect musculoskeletal complaints (Karimi, Moghimbeigi, Motamedzade, & Roshanaei, 2016). Based on the characteristics of musculoskeletal complaints about *songket* weavers in Palembang, there was lower neck pain of the most complaints (37.1%)

than upper neck pain (18.4%), and the weavers were felt very sick as many as 10.4% (Yosineba, et al 2020). The working and work attitude period was also related to the incidence of carpal syndrome in batik makers (Agustin, 2012).

The study in Bangladesh on male weaving craftsmen, it was reported that musculoskeletal complaints were significantly related between age and years of working period (Hossain, Kamrujjaman, & Malleque, 2018). Physiologically musculoskeletal complaints are caused by low oxygen levels due to awkward posture and static body position for a long time causing anaerobic metabolism in the body which results in the accumulation of lactic acid in muscles, it can be caused by musculoskeletal complaints such as pain, ache, and fatigue (Sari, R. O., & Rifai, 2019).

Besides, Repetitive movements of the hands that are carried out more than 20 times every day also cause complaints of Carpal Tunnel Syndrome in Seruling Etan Batik craftsmen (Setyoaji, Jayanti, Ekawati, & Widjasena, 2017). Therefore, to reduce musculoskeletal complaints due to weaving activities, it is necessary to do muscle stretching exercises at the workplace. According to a study on the effect of stretching on reducing complaints of low back pain, there was a significant effect (Maksuk, Amin, & Jaya, 2021; Yuni, 2018). Stretching muscles exercise at the workplace can reduce complaints of musculoskeletal disorders in traditional weavers Samarinda (Ramdan & Azahra, 2020).

The reduction of musculoskeletal complaints was caused by exercise interventions given the addition of Cervical Stabilization Exercise to Contract Relax Stretching was better to reduce neck disability due to myalgia in working in a static position (Fauziah et al., 2018). In addition, muscle stretching also contributes to reducing complaints of low back pain in workers in the production division of PT. SDJ Pontianak (Satriadi, 2018). Based on a study reported that there were differences lower back pain scale before and after the McKenzie Back Exercise at *Songket* Weavers in Indralaya (Navariastami, Koswara, & Ningsih, 2015). The stretching movement is also an effort to reduce complaints of low back pain (LBP) in batik craftsmen with a static sitting position and for a long time (Rini, Aswin, & Hidayati, 2021).

Therefore, to anticipate musculoskeletal complaints in weavers, it is very important to do muscle stretching every day in the workplace to reduce pain, prevent muscle injury and work-related diseases. Workplace stretching exercise is a non-pharmacological treatment that is very helpful in reducing musculoskeletal complaints, especially for traditional weavers. The limitation of this research is that the number of samples is too small because the samples were taken during a pandemic, so the number of weavers is limited to work.

CONCLUSION

Workplace Stretching Exercises are effective to reduce musculoskeletal complaints, especially in weavers with static work positions and working for long periods of time. Stretching exercises can reduce musculoskeletal complaints for traditional weavers if they are done regularly.

Workplace Stretching Exercises are one of the non-pharmacological treatments to help and anticipate musculoskeletal complaints, especially for traditional weavers, and need to be cultivated in the workplace.

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