

# The Effect Of Dynamic Stretching On Musculoskeletal Disorders (MSDs) In Smoked Fish Workers

*by* Yuliani Setyaningsih

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**The Effect Of Dynamic Stretching On Musculoskeletal Disorders (MSDs) In Smoked Fish Workers**

Nur Cahyani Amaliawati Rahmat<sup>1\*</sup>, Yuliani Setyaningsih<sup>2</sup>, Suroto Suroto<sup>3</sup>

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<sup>1</sup> Master of Health Promotion, Faculty of Public Health, Diponegoro University, Semarang

<sup>2,3</sup> Department of Health Promotion, Faculty of Public Health, Diponegoro University, Semarang

ABSTRACT

**Background:** Fish can be processed and preserved in a variety of ways, including smoking. The workers' activities are repetitive, requiring them to sit in an unergonomic position for extended periods of time. Unnatural work attitudes and monotone work might result in workers complaining of MSDs. The purpose of this study is to analyze the effect of giving dynamic stretching using a hoop on MSDs complaints to fish smoking workers.

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**Methods:** This study employs a Quasy-Experimental design with a non-ivalent control group. The sample for this study comprised 25 respondents in the treatment group and 25 respondents in the control group who met the inclusion criteria by purposive sampling are 35-60 years old, willing to be a respondent and communicative, and attend the pre-post test. The NRS was employed as the research instrument, starting from a scale of 0 to 10. A scale of 0 means no pain, 1-3 means mild pain, 4-6 means moderate pain, 7-10 means severe pain. Analyses of data using the Mann-Whitney statistical test.

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**Results:** The result of this study is that there is a significant difference in the MSDs complaint scale based on the Mann-Whitney test between the treatment group and the control group with a p-value of 0.000 ( $p < 0.05$ ).

**Conclusion:** Dynamic stretching using a hoop has an effect on reducing MSDs complaints in fish smoking workers.

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CONTACT

Nur Cahyani Amaliawati Rahmat



[amaliawati11rcahyani@gmail.com](mailto:amaliawati11rcahyani@gmail.com)

Master of Health Promotion,  
Faculty of Public Health,  
Diponegoro University, Jl. Prof.  
Soedharto, SH, Tembalang,  
Semarang, Indonesia.

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INTRODUCTION

In the current modern era, the use of technology in various fields is increasing. This is supported by the increasing number of industries that use technology in every process they do. Indonesia is a labor-intensive country, but it cannot be separated from the use of technology. The use of technology in industrial zones in Indonesia alone is

not enough. It is undeniable that there are still some processes that require human labor in handling or manual handling.

The informal sector is currently growing at a faster rate than the formal sector. Based on data from the Central Java Provincial Statistics Agency in February 2020 as many as 10.52 million people or 58.49 percent worked in the informal sector (BPS Jawa Tengah, 2018). However, this sector has far from appropriate welfare requirements. In general, informal sector workers are overworked and underpaid, and informal sector employers disregard occupational safety and health regulations (Wulandari, 2013).

Based on the initial interview, it was found that the worker had complaints of back, waist, shoulder and leg pain. There are several things that affect the occurrence of subjective musculoskeletal complaints in workers, namely the sitting position of workers who bend over can provide a separate pressure load on the spine, legs that are always bent due to non-ergonomic work chairs and workers do their work with a monotonous work attitude and in a long period of time. The old one, which is almost every day, namely Monday, Tuesday, Wednesday, Thursday, Saturday and Sunday starting from 08.00 until the afternoon around 16.00 or until the fish run out.

In addition, workers have long working hours with work activities that do not move from place to place. Activities carried out by workers smoking fish can pose various risks, one of which is complaints of Musculoskeletal Disorders (MSDs) caused by non-ergonomic work attitudes. Ergonomics improvements can be made to prevent the occurrence of a disease by engineering control and administrative control.

At the fish smoking center, engineering control has been carried out in the form of providing an ergonomic work table with a standing position but the workers do not use the ergonomic table due to the habitual factor of the workers who are not comfortable with the standing position. Therefore, it is necessary to improve ergonomics in the form of administrative control. Ergonomics improvement is done by providing non-pharmacological therapy through a preventive approach in the form of giving certain exercises as a preventive measure.

One form of exercise therapy that can be given is dynamic stretching. Dynamic stretching is one of the alternative therapies that is common<sup>7</sup> used by someone in overcoming problems in the muscles if they have been working in a static position for a long time because this position can cause several complaints, such as complaints of muscle pain. With an unnatural attitude, dynamic stretching can be applied to reduce the risk of injury to the body by first preparing the muscles before carrying out their activities. Contraction of these muscles will reduce the risk of injury to the waist by contracting simultaneously thereby increasing stabilization and reducing imbalance muscles. Dynamic stretching is done for 10 minutes.

This is supported by the statement that stretching exercises performed for 5-10 minutes can reduce muscle pain (Ariyanto et al., 2012).<sup>31</sup> Dynamic stretching was performed for 1 week. This is supported by the theory of the American College of Sports Medicine (ACSM) which says that effective stretching and flexibility exercises are 3-5 times per week (Garber et al., 2011). This dynamic stretching uses a tool called a "hoop". A hoop is a large ring-shaped instrument made of bamboo or rattan which is joined at both ends to form a circle.

This tool is 60–90 cm in diameter and weighs 300 grams. Respondents have their own hoops which are named on each hoop and may not be used by others. When doing dynamic stretching, the distance between respondents is 2 meters. After doing dynamic stretching, the hoop was then cleaned, wiped and sprayed with disinfectant, then

wrapped in plastic and then reused the next day. Dynamic stretching movements with hoops are carried out focusing on the neck, hands, shoulders, back, waist, and legs which function to flex the muscles in the focused part.

Based on research conducted on the elderly in Mekar Sari Village, Delitua District, Deli Serdang Regency using the hip exercise method, it shows that there is a difference between respondents' lower back pain before and after being given hip exercise intervention. This can be seen from the results of the mean value for low back pain before the intervention was 1.50 while the mean value for low back pain after the intervention was 1.10. Based on the paired t-Test with a level of significance = 0.05 (5%), the obtained p value = 0.017 means that there is an effect of hip movement exercises (stretching) on the level of low back pain in the elderly (Tumagor & Ginting, 2020).

## MATERIALS AND METHOD

A quantitative study using the Quasy Experiment Design method in conjunction with a Non-Equivalent Control Group design. By include a control group in addition to the treatment group, this design seeks to elucidate a causal relationship. Dynamic stretching was administered to the treatment group, but not to the control group. In both groups, the study began with a pre-test and concluded with a re-measurement (post-test).

The research was performed in March 2021 at the Wonosari Fish Smoking Center in Demak Regency, Central Java. The population of this study was 315 people, all of them were fish smoking workers in Wonosari Village, Bonang District, Demak Regency. The sample size using the formula for unpaired numerical analytical research sample size. The sample size obtained for each group is then corrected by 10%, essentially the required sample size is increased by 10% to account for possible dropouts, resulting in a total sample size of 25 for each group (the treatment group is 25 people and the control group is 25 people). Next determine the treatment group and control group.

The grouping of samples begins with collecting data on the respondents according to the research criteria. The inclusion criteria were: (1) 35-60 years old, (2) willing to be a respondent and communicative (3) attending the pre-post test. While the exclusion criteria were: (1) not willing to participate in the research, (2) unable to fully participate in research activities, (3) falling ill during the research, (4) respondents have other diseases that can be triggered by giving dynamic stretching such as asthma and heart disease. Sampling in the treatment group and control group was carried out until the sample target was met.

For ten minutes, dynamic stretching is performed. For one week, dynamic stretching was performed. This dynamic stretching is accomplished by the use of a tool known as a "hoop". A hoop is a large ring-shaped bamboo or rattan instrument that is linked at both ends to form a circle. This tool has a diameter of 60–90 cm and a weight of 300 grams.

Each respondent has their own hoop, which is labeled with their name and may not be shared. When responders are performing dynamic stretching, the distance between them is set at two meters. After performing dynamic stretching, the hoop is cleaned, wiped, and disinfected, and then wrapped in plastic. The following day, it was reused. Dynamic stretching movements with hoops are performed on the neck, hands, shoulders, back, waist, and legs to flex the targeted muscles.

The Numeric Rating Scale (NRS) was employed as the research instrument. The instrument for measuring the NRS pain scale has been tested for validity and reliability before. Based on research conducted by Li, Liu and Herr, which compared four pain scales, name NRS, Face Pain Scale Revised (FPS-R), VRS for postoperative clients, it showed that the four pain scales showed good validity and reliability. On the validity of the NRS pain scale shows  $r = 0.90$ . While the NRS reliability test figures show reliability of more than 0.95 (Swarihadianti, 2014; Li et al., 2007).

The data obtained were analyzed using SPSS for windows version 16.0 and presented in the form of tables and narratives. The data collected, then tested for normality. Based on the results of the normality test, it was found that the data were not normally distributed so a non-parametric test was carried out using the Mann Whitney test to determine the difference between the treatment group and the control group.

Health Research Ethics Committee Faculty of Public Health Diponegoro University (Reference number 52/EA/KEPK-FKM/2021). Before giving the pre-test to the respondents, the researchers introduce themselves to prospective respondents and ask permission from prospective respondents, then provide technical-related explanations about the procedures for conducting research and the benefits that will be obtained by respondents at the time of research, and then if the respondent does not understand the explanation from the researcher, the researcher will re-explain the intent and purpose, afterwards provide opportunities for prospective respondents to ask questions related to research, later the researcher provided an informed consent form to be read and signed by the respondent.

## RESULTS

The research results are described in the following table:

**Table 1.** Frequency Distribution of Respondents Based on Research Variables

Characteristics	Treatment Group		Control Group	
	Frequency	(%)	Frequency	(%)
<b>Age</b>				
35-40	16	64	13	52
41-45	6	24	8	35
46-50	2	8	3	12
51-55	1	4	1	4
<b>Gender</b>				
Male	11	44	9	36
Female	14	56	16	64
<b>Years of service</b>				
<3 tahun	2	8	1	4
>3 tahun	23	92	24	96
<b>Nutritional Intake</b>				
None	25	100	25	100

Table 1 shows that the most respondents in the treatment group (64%) were in the age group of 35-40 years. While the majority of respondents in the control group were between the ages of 35 and 40 (52%), most respondents in the control group were between the ages of 35 and 40, the most of respondents in the treatment group (56%) were female, while the most of respondents in the control group were female (64%), the



most respondents in the treatment group had a year of service was >3 years, accounting for 92% of respondents.

Meanwhile, the control group revealed that the majority of respondents (96%) had over three years of service, none of the respondents met their nutritional intake completely or received supplementary food and drink while working.

**Table 2.** Results of Pre-Test and Post-Test Treatment Group and Control Group

Scale	Treatment Group		Control Group	
	Frequency	(%)	Frequency	(%)
<b>Pre-Test</b>				
Mild Pain	5	20	3	12
Moderate Pain	18	72	21	84
Severe Pain	2	8	1	4
<b>Post-Test</b>				
Mild Pain	23	92	2	8
Moderate Pain	2	8	20	80
Severe Pain	0	0	3	12

Table 2 shows that the measuring of Musculoskeletal Disorders (MSDs) complaints in the treatment group prior to dynamic stretching. Most respondents reported having Musculoskeletal Disorders (MSDs) pain complaints that came into the moderate pain category (72%). After conducting dynamic stretching with a hoop, the Musculoskeletal Disorders (MSDs) pain scale was changed to a mild pain category (92%).

The most respondents in the control group reported moderate-to-severe Musculoskeletal Disorders (MSDs) pain (84%). Following the post-test, the majority of control group respondents Musculoskeletal Disorders (MSDs) pain scales remain in the moderate pain category (80%).

**Table 3.** Differences in Pre-Test and Post-Test Results of MSDs Pain Complaints

Group	n	Mean	SD	p-value	Information
<b>Pre-Test</b>					
Treatment	25	2,88	0,526	0,727	Not significant
Control	25	2,92	0,400		
<b>Post-Test</b>					
Treatment	25	2,08	0,277	0,000	Significant
Control	25	3,04	0,455		

Table 3 shows that in this study, dynamic stretching method using hoops can greatly lower the scale of Musculoskeletal Disorders (MSDs) pain complaints in the treatment group. The average value on the Musculoskeletal Disorders (MSDs) pain complaint scale during the pre-test is  $2.88 \pm 0.526$  (moderate pain), but after receiving dynamic stretching treatment with a hoop, the average value reduced to  $2.08 \pm 0.277$  in the treatment group (mild pain).

## DISCUSSION

The results of this study reinforce research showing that sitting statically for long periods and not having the opportunity to relax or stretch has been shown to have a

higher risk of low back pain (Samara et al., 2005). This is also showed by research conducted on workers in the final packing and part supply section, which indicates that seven respondents (9.7%) experience lower back pain as a result of their habit of participating in sports, and 41 respondents (32.8%) experience lower back pain due to a lack of physical activity (Munir, 2012).

This study is supported by research indicating that there is no difference in the level of skeletal muscle complaints between the treatment and control groups of sewing workers in Susukan Semarang during the pre-test (Oknanto, 2014). These findings are also supported by research that indicates that there are differences between the control and treatment groups following an intervention in the form of ergonomic exercise to alleviate pain complaints associated with Musculoskeletal Disorders (MSDs) in the treatment group; additionally, the control group experienced an increase in MSDs pain as a result of not receiving any intervention (Nunik, 2015).

This research is also in line with research conducted on employees at PT. Rifan Financindo Futures Semarang Branch using the sit stretching method showed that the lower back pain scale in the intervention group after being given sit stretching mostly decreased low back pain scale, while the control group low back pain scale mostly did not change the low back pain scale, but there is 1 respondent there is a decrease and there are 4 respondents an increase in low back pain scale. Based on the statistical test using Mann Whitney obtained a p-value of 0.001, so it can be concluded that there is an effect of sit stretching on changes in the low back pain scale in employees (Putra et al., 2018).

This study is also in line with research which shows that the results of the paired t test showed a significant value in the control group of  $0.019 > 0.005$  so it can be concluded that the provision of stretching exercises at work is effective for reducing pain due to MSDs (Priyoto & Wahyuning, 2019). Giving dynamic stretching is an intervention that is included in the non-pharmacological approach through the administration of certain exercises; exercise can assist in reducing weakness, relieve stress, and build muscle strength. Additionally, this activity can improve blood circulation and cell oxygenation, thereby reducing symptoms of cell oxygen deficiency, which can result in an increase in lactic acid, which causes pain.

Sitting for an extended period is the leading cause of musculoskeletal complaints. Therefore, stretching is important to activate the muscles and maintain proper blood circulation; this method is beneficial in preventing workers from developing musculoskeletal complaints (Anderson, 2010). Following the stretching intervention, a statistically significant reduction in pain was seen. Neck and shoulder musculoskeletal symptoms also improved considerably following stretching exercises (Lee & Gak, 2014). Dynamic stretching has been shown to impact the pain complaint scale of respondents with Musculoskeletal Disorders (MSDs).

This is because the intervention educates respondents on how to manage musculoskeletal pain through dynamic stretching. Additionally, respondents will learn that dynamic stretching can help lower the severity of musculoskeletal pain complaints through this training. By stretching, an individual can alleviate muscle tension, prevent muscle cramps, and increase awareness of certain body parts, particularly those that are frequently used for activities (Anderson, 2010).

## CONCLUSION

The most respondents in both the treatment and control groups were between the ages of 35–40 years, were female, had worked for at least three years, and received no nutritional intake. Prior to receiving dynamic stretching, the Musculoskeletal Disorders (MSDs) pain scale was in the moderate pain group (72%), but after receiving dynamic stretching, it was in the mild pain category (92%).

Thus, with a p-value of 0.000 ( $p < 0.05$ ), there is a significant difference in the Musculoskeletal Disorders (MSDs) complaint scale between the treatment and control groups. It is recommended to do further research by applying dynamic stretching using hoops or other tools 2 times a day. compared dynamic stretching using a hoop with another method, providing additional nutritional intake such as snacks every 2 hours after breakfast or lunch.

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