



## Comparison between contract-relax stretching and McKenzie neck exercise on decreasing pain of upper trapezius muscle in peeling onions workers

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### ABSTRACT

**Background:** Upper trapezius muscle pain is caused by overuse of the neck, hand, and shoulder muscles with the same movement resulting in decreased oxygen supply to the muscles. The treatments that can be given are contract-relax stretching and McKenzie neck exercise. Contract relax stretching aims to reduce pain with stretching techniques. McKenzie's neck exercise aims to relax muscles, reduce spasms and return the alignment of the neck to a normal position.

**Methods:** This type of research is a pre-experimental study with two pretest and post-test design groups. This design uses two groups to compare the causal relationship between the independent and dependent variables. The research population was

peeling onion workers at CV. Anita Jaya Sukses had upper trapezius muscle pain. The sample of this study is a member of the people that meets the inclusion and exclusion criteria with a total of 18 selections. The sampling technique used purposive sampling. The research instrument used is the numeric rating scale (NRS).

**Results:** The Independent Sample T-Test showed that giving contract-relax stretching and McKenzie neck exercise had a significant value of 0.005 ( $p < 0.05$ ), so  $H_1$  was accepted.

**Conclusion:** There is a difference in the effect between contract-relax stretching and McKenzie neck exercise on reducing upper trapezius muscle pain in onion peel workers' CV. Anita Jaya Sukses and McKenzie's neck exercise has proven more effective.

**Keywords:** contract relax stretching, mckenzie neck exercise, pain, upper trapezius muscle.

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### BACKGROUND

One of the jobs that are at risk of causing health problems is labor. Workers often experience unergonomic work positions in a sitting place that requires bending down in the work process, such as workers peeling onions. These work activities can cause the body to become stiff in certain parts, and harmful working posture for a long time can result in muscle injuries due to poor blood circulation throughout the body.<sup>1</sup>

One of the most common complaints is pain in the neck. Neck pain is often found due to occupational diseases whose causes are factors related to the place and work environment.<sup>2</sup> In 2017, the age-standardized global prevalence and incidence of neck pain were 3551.1 and 806.6 per 100,000, respectively.<sup>3</sup> Neck pain burden was higher in women than men and is higher in developed countries and urban areas. Some factors influence neck pain's duration and process, such as environmental and personal factors.<sup>4</sup>

Because neck pain has become a common problem, it is estimated that the incidence of neck pain is around 15%. Neck pain is also the second most common disease after low back pain, which occurs in the general population and musculoskeletal

practice.<sup>5,6</sup> In Indonesia, the incidence of cervical pain continues to increase. About 16.6% of adults complain of cervical discomfort region, even 0.6% started from feeling uncomfortable cervical pain that turns into severe cervical pain. Reference also finds that it increases with age and is more common in women than in male, with a ratio of 1.67:1.6.<sup>7</sup>

The driving muscles in the neck include the trapezius, sternocleidomastoid, longissimus capitis, and levator scapulae. The forces that experience tension when the neck bends function for head extension and help the movement of the head extension. The muscle that lies superficially and supports the direction of the head for extension is the upper trapezius muscle.<sup>8</sup>

Intervention that physiotherapists can give contract-relax stretching, which involves isometric contractions of muscles experiencing spasms or tension followed by a relaxation phase and the passive stretching of the muscles experiencing pressure.<sup>9</sup> Another intervention that can be used is the McKenzie neck exercise. McKenzie neck exercise is an exercise in the form of stretching the spine and muscles which aims to improve or correct wrong posture during static and dynamic activities, restore normal neck alignment, reduce stiffness in

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the intervertebral joints caused by muscle spasms, and provide muscle elongation effect.<sup>10</sup>

Based on a preliminary study on onion peeler's CV. Anita Jaya Sukses, workers complain of pain and discomfort in the upper trapezius muscle while working. However, it is not yet known which intervention is more effective. Therefore, researchers are interested in the "Comparison between Contract Relax Stretching and McKenzie Neck Exercise to decrease upper trapezius muscle pain in onion peel workers."

## METHODS

This type of research is quasi-experimental with two pretest and post-test design groups. In the McKenzie neck exercise, six to eight repetitions are carried out thrice a week for four weeks. Meanwhile, contract-relax stretching is done at a 30-second interval and twice a week for four weeks. The population in this study were onion peelers at CV. Anita Jaya Sukses. Sampling using a purposive sampling method. This research was conducted at CV. Anita Jaya Sukses, in March 2022. The sample of this study is a member of the people that meets the inclusion and exclusion criteria with a total of 18 selections.

The measuring tool used is the numeric rating scale (NRS) to measure pain levels. The numerical scale presented the highest reliability value ( $r=0.99$ ).<sup>11</sup> A good-to-excellent correlation was found between NRS and VRS (Verbal Rating scale) scores ( $r=0.925$ ).<sup>12</sup> Data analysis used the Shapiro-Wilk test, paired *t*-test, and independent *t*-test. All participants explained the study process and received an informed consent sheet once they agreed to participate.

## RESULTS

The pie chart in Figure 1. A shows the age characteristics of the research respondents. Based on table 1. offers the age group of respondents to CV. Anita Jaya Sukses onion peeler workers mainly were in their late teens (17-25 years) with a total of 6 people (33%), respondents with early adulthood (26-35 years) 5 people (28%), respondents with the late majority (36-45 years) 5 people (28%) and respondents with early elderly age (46-55 years) 2 people (11%).

Based on Figure 1. B showed the gender group of the respondents in the onion peeler CV. Anita Jaya Sukses. The women were 12 (67%), while the men were six people (33%). Based on the diagram below depicts that the onion peeler workers who were the respondents in this study were primarily female.

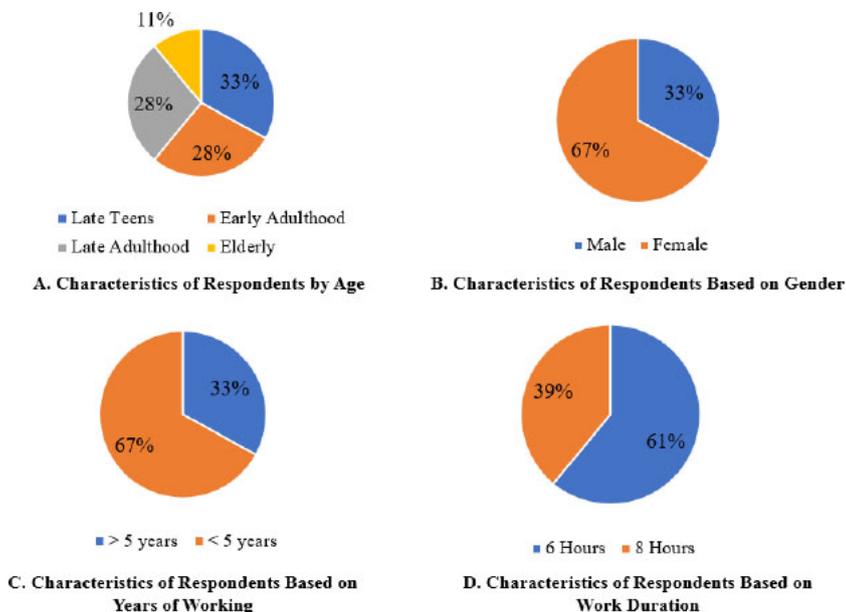
Figure 1. C. illustrates the group of respondents in the onion peeler CV. Anita Jaya Sukses has worked chiefly under five years of 12 people (67%) and more than five years of 6 people (33%). Figure 1. D The working duration of respondents in CV. Anita Jaya Sukses onion peeler workers mostly worked in a day for 6 hours for 11 people (61%) and worked for 8 hours for seven people (39%).

The following line graph shows the pretest and post-test measurements of upper trapezius muscle pain by measuring the NRS in the contract-relax stretching and McKenzie neck exercise treatment group). Based on Figure 2. below, it can be seen that there was a change in pain in the pre and post-test of the contract-relax stretching group. It is known that the pretest results were 6.222, which in the NRS score results included in the moderate category, while the post-test results were 4.667 with a difference of 1.555, wherein the NRS scores were included in the mild category.

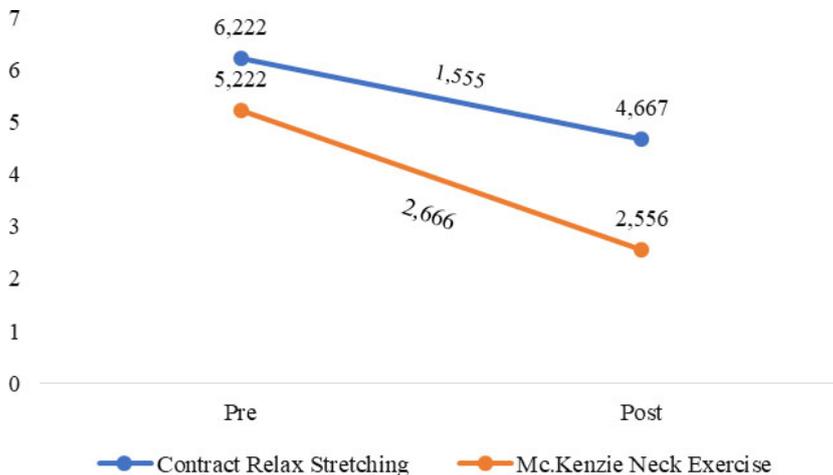
In contrast, the McKenzie Neck exercise group data showed a change in upper trapezius muscle pain in the pre and post-test. It is known that the pretest results were 5.222 in the NRS score results included in the moderate category, while the post-test results were 2.556 with a difference of 2.666 and were a part of the mild category in the NRS.

The results of the normality test of the Shapiro-Wilk test using SPSS showed significant values for the pretest and post-test contract-relax and McKenzie neck exercise ( $p>0.05$ ), with each considerable value of 0.248 and 0.850, so the resulting data distribution was normal.

Based on the results of the paired *t*-test below, it was obtained that the pain value before and after being given the relaxing stretching contract intervention experienced a significant difference. Of the nine respondents, the results of the paired



**Figure 1.** A-D Characteristics of Respondents.



**Figure 2.** Pain Measurement Results Before and After Intervention in Onion Peeling Workers.

**Table 1.** Normality Test Results

Group	N	McKenzie	Contract Relax
		p	p
Pretest	18	0.066	0.062
Post-test		0.248	0.850

\*Shapiro-Wilk test; N : Number of respondents; p: significant value

**Table 2.** The results of the paired t-test and independent t-test before and after the exercise on onion peelers at CV. Anita Jaya Sukses

Groups	N	p-value paired t-test	p-value independent t-test
Contract Relax Stretching	9	0.000	0.005
Mc.Kenzie Neck Exercise	9	0.001	0.005

\*N: number of respondents

t-test were obtained after the intervention was given  $p=0.000$  ( $p<0.05$ ). At the same time, on t-count (8.854) and t-table (2.306), it can be concluded that there was a significant increase in the decrease in considerable pain before and after the contract-relax stretching treatment in onion peelers.

Based on the results of the paired t-test in Table 2, it was obtained that the value of pain before and after being given the McKenzie Neck Exercise intervention experienced a significant difference. Of the nine respondents, the results of the paired t-test were obtained after the intervention was given  $p=0.001$  ( $p<0.05$ ), while on t-count (4.824) and t-table (2.306). So, it can be concluded that there was a significant increase in the reduction of upper trapezius muscle pain, which means before and after the McKenzie neck exercise treatment in onion peelers.

A comparison of Contract Relax Stretching and McKenzie Neck Exercise can be seen in Table 2 above. From the results of data analysis using the Independent Simple T-Test test above, it can be seen in the table above that a significant value

(p-value) obtained of 0.005 because  $0.005<0.05$  while in t-count (3.258) and in t-table (2.119) thus indicating that there was a significant difference in effect. It can be concluded that  $H_1$  was accepted, and there were differences in the impact of contract relaxation and McKenzie neck exercise on reducing upper trapezius muscle pain in onion peelers.

## DISCUSSION

In the Paired T-test results in this study, after being given the contract-relax stretching intervention, it can be concluded that  $H_1$  is accepted, which means contract-relax stretching exercises effectively reduce upper trapezius muscle pain in onion peelers in CV Anita Jaya Sukses.

Contract Relax Stretching is a technique that optimizes isometric contractions from shortened muscle groups. Contract relax stretching is a PNF or Proprioceptive Neuromuscular Facilitation technique that combines isometric stretching techniques with passive stretching in its implementation. The purpose of administering contract-relax stretching is to lengthen soft tissue structures such as muscles, fascia, tendons, and ligaments so that it can reduce pain due to muscle shortening.<sup>13</sup>

Contract relax stretching can activate the Golgi tendon organ (GTO), sensitive to the overstretch response.<sup>14</sup> Activation of the GTO will stimulate afferent impulses to the spinal cord. Then in the spinal cord, the afferent impulses will meet with inhibitory motor neurons and cause the cessation of efferent impulses in causing contractions resulting in a significant and sudden decrease in tone. After experiencing maximum isometric contraction followed by ultimate relaxation and expiration, it can accelerate muscle relaxation and reduce adhesion to tissues that experience tightness. Muscular muscle contractions will facilitate the pumping action mechanism so that local metabolic and circulation processes can occur appropriately due to vasodilation and relaxation, thus transporting metabolic and the remnants of amebolism produced through the inflammatory cycle can smoothly run so that pain can be reduced.<sup>15</sup>

In this study's paired t-test results, after being given the McKenzie neck exercise intervention, the value is less than alpha, so it can be concluded that  $H_1$  is accepted. Thus, it can be interpreted that McKenzie's neck exercise reduces upper trapezius muscle pain in the onion peeler at CV Anita Jaya Sukses.

McKenzie's cervical exercise is a form of exercise to reduce neck pain. It can increase neck muscle

flexibility, help reduce muscle spasms, increase limited joint range of motion, and restore neck posture to its anatomical position.<sup>16</sup> The goal is to overcome the problem of neck or back pain by practicing independently so that the patient can move and restore body function. This exercise has considerable benefits in changing the value of limited joint motion and is proven to reduce pain.<sup>17</sup>

In the study by Jaleha et al.,<sup>18</sup> McKenzie Neck Exercise Intervention can reduce patient pain. The decrease in pain was due to the McKenzie exercise giving a relaxing effect on the muscles after maximum contraction, causing an inhibitory effect on the spasming muscles. McKenzie Neck Exercise can produce a mechanical effect on the muscles, gradually decreasing muscle tension due to activity, and other connective tissues are easily stretched. Thus it can be concluded that the administration of McKenzie Neck Exercise can reduce pain in patients with complaints of neck pain.

Based on the independent *t*-test, which aims to compare the reduction in upper trapezius muscle pain, a value of 0.005 is obtained, indicating a difference in the effect of contract-relax stretching and McKenzie neck exercise, shows that the McKenzie neck exercise intervention is more effective than contract-relax stretching in reducing upper trapezius muscle pain.<sup>19</sup> This difference is because there are different mechanisms between the two interventions. In contrast, in the McKenzie neck exercise, there are five movements: head retraction in sitting, neck extension in sitting, side bending of the neck, and neck retraction. The McKenzie exercise is an effective intervention for solving musculoskeletal problems and is widely used in clinical practice. Youn and Sung noted that head and shoulder posture significantly improved after performing the McKenzie exercise in patients with chronic neck pain. Moreover, patients with neck pain who undertook the McKenzie exercise also experienced decreased pain, improved function, and positional change.<sup>20</sup>

At the same time, contract-relax stretching uses isometric contractions with one movement.<sup>21</sup> Contract Relax intervention Stretching also has an impact reduction of pain due to isometric contractions with deep inspiration and stretching followed by maximal expiration rhythmically will produce a reaction rhythmic pumping action anyway so it will help improve blood flow carry metabolic waste products and irritants that cause muscle pain back to the body heart.<sup>22</sup>

The limitation of this study was other factors that caused differences between the two interventions could be seen from the duration of the intervention and the repetition. In the McKenzie neck exercise,

six to eight repetitions are carried out thrice a week for four weeks. Meanwhile, contract-relax stretching is done at a 30-second interval and twice a week for four weeks.

## CONCLUSION

Based on the results of this study, both Contract Relax Stretching and Mc Kenzie Neck Exercise were effective in reducing upper trapezius muscle pain in onion peelers. Still, McKenzie Neck Exercise was more effective in reducing upper trapezius muscle pain.

## ETHICAL CONSIDERATIONS

The authors obtained informed consent that the sample had been approved before conducting the study.

## CONFLICT OF INTEREST

There is no conflict of interest that the author declares following the publication.

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## AUTHOR CONTRIBUTION

ZIL conceived the study concept and design, analyzed the data, and drafted, reviewed, and edited the manuscript; DRA collected and analyzed the data, and drafted the manuscript; AY conceived the study concept, analyzed the data, and drafted the manuscript.

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