

Difference in the Effect of Giving Neck Stabilization Exercise with Stretching on Improvement of Neck Functional Ability in Non-Specific Neck Pain

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ABSTRACT

Background: Tailor workers when working with a bowed position and a long static position, the muscles will contract excessively resulting in spasm and pain that causes non-specific neck pain which will interfere with the functional ability of the neck. Neck stabilization exercises and stretching can be exercises to improve neck functional ability in non-specific neck pain. This study aims to determine the difference in the effect of neck stabilization exercise and stretching on increasing the functional ability of the neck in non-specific neck pain.

Subjects and Method: This study is a randomized controlled trial using a two-group pretest and post test design conducted at sevinta convection and padi emas from November to December 2023. A total of 24 subjects were selected by random sampling and randomly allocated into 2 groups. Group 1 was given neck stabilization exercise and group 2 was given stretching. The dependent variable is neck functional ability in non-specific neck pain and the independent variables are neck stabilization exercise and stretching. The measuring instrument used is the neck disability index to measure neck functional ability. Data analysis using independent sample t test.

Results: The results after the intervention obtained neck functional ability in non-specific neck pain increased in both groups. There is a statistically significant difference in neck stabilization exercise (Mean = 4.00; SD = 2.21) and stretching (Mean = 6.83; SD = 2.79), and it was statistically significant ($p = 0.012$).

Conclusion: There is a significant difference in the effect of neck stabilization exercise and stretching on improving neck functional ability in non-specific neck pain. Neck stabilization exercise is more influential than stretching on improving neck functional ability in non-specific neck pain.

Keywords: neck stabilization exercise, stretching, neck disability index.

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BACKGROUND

Non-specific neck pain can be defined as neck pain without a specific disease that causes pain, for example due to diseases such as rheumatism, osteoporosis, cancer, or radiculopathy. Acute, subacute, and chronic pain that is not caused by an ab-

normal anatomical structure is called non-specific neck pain (Tsakitzidis et al., 2009). According to the International Association for the Study of Pain, neck pain is divided into acute conditions where the duration of pain is less than 3 months, chronic pain with a duration of more than 3 months and

sub acute pain where the duration is less than 3 months or at least 6 weeks.

The cervical has the function of being a conduit for the passage of blood vessels, nerves and to support the head. The neck muscles experience fatigue due to a bowed or overused neck posture, which contributes to pain. When a person keeps their head in one position all day, it puts pressure on the discs, joints and muscles, causing pain (Schofferman, 2001).

Based on data from The Global Burden of Disease Study in 2017, globally the prevalence of neck pain is 3551.1 per 100,000 population. While the prevalence of neck pain in Southeast Asia was 2836.8 per 100,000 population. In 2017 the prevalence of neck pain occurred more in women than men.

Neck pain is a risk that occurs in convection workers. Convection is one of the businesses that continues to grow by providing services in the manufacture of office uniforms, school uniforms, t-shirts in large quantities with an 8-hour working day. The convection section consists of cutting (cutting fabric), production (sewing and tearing) and finishing (ironing, packaging and shipping) (Ramayanti, 2021). Work in convection causes the risk of musculoskeletal disorders such as neck pain, one of which is in the sewing section, because the sewing process uses both hands to be on the sewing machine table to hold and sew the stitching object, both feet press the dynamo, and the position of the neck which tends to bow for a long time (Wulandari et al., 2017). Muscle complaints generally occur due to excessive muscle contraction due to the provision of workloads that are too heavy with a long duration of loading. The work position of sitting continuously with the head down for a long time results in complaints in the form of aches and pains in the neck area (Tarwaka, 2004). With complaints in the mus-

cles such as aches and pains due to spasms in tailors will affect the daily functional abilities of workers.

According to Kisner & Colby (2017), functional ability is related to forming segmental spinal stability; forming flexibility, muscle endurance and strength; and posture correction to reduce pressure, so that everything can function safely in daily activities.

To improve functional ability in neck pain conditions, physiotherapy interventions can be given. According to Blanpied et al. (2017) several physiotherapy interventions that can reduce complaints in non-specific neck pain are exercises such as stretching/muscle stretching, isometrics, strengthening, neck stabilization exercise/stabilization, muscle endurance training, aerobic exercise, manual therapy such as manipulation or mobilization of the thoracic, cervical and cervicoscaphulothoracic regions. Other interventions are also recommended such as dry needling, low-level laser, repetitive brain stimulation, transcutaneous electrical nerve stimulation (TENS), pulsed/high-power ultrasound, intermittent mechanical traction and electrical muscle stimulation.

Interventions that will be carried out in this study are stretching and neck stabilization exercise. Stretching is one of the exercise therapies that can increase soft tissue extensibility, thereby increasing muscle flexibility and the scope of joint motion needed to achieve good functional ability by extending or lengthening shortened and hypomobile tissue structures (Kisner and Colby, 2012). According to research by Tunwattanapong et al. (2016) obtained the results of stretching exercises performed regularly can reduce neck and shoulder pain and improve the functional neck and quality of life of office workers who have chronic neck and shoulder pain from moderate to

severe degrees. Research conducted by Alfawaz et al., (2020) found the results of adding stretching to standard procedures (cervical passive mobilization and cervical rotation active motion training) were more effective than standard procedures alone in increasing active LGS of cervical extension, right rotation, and lateral flexion, but not effective in reducing pain and increasing functional ability.

Neck stabilization exercises (NSE) aim to activate and control the muscles that control axial extension (cervical retraction) involving capitis flexion, slight straightening of the cervical lordosis curve and straightening of the upper thoracic kyphosis curve by maintaining the cervical spine in a neutral position. The deep cervical flexor muscles function for cervical retraction and provide segmental stability of the cervical spine. With the activation of the stabilizer muscle (deep cervical flexor) the cervical is more stable, over-contraction of superficial muscles will be reduced thereby increasing functional ability (Kisner & Colby, 2017).

Referring to research conducted by Kaka et al., (2015) found that neck stabilization exercises can reduce pain intensity and improve functional abilities in participants with non-specific neck pain. In another study conducted by Dusunceli et al., (2009) the results in this journal found that NSE was more effective in reducing pain intensity and functional ability in neck pain than isometric and stretching combined with physical agent modalities.

Based on previous studies, for example, as in the research of Dusunceli et al., (2009) the exercises given were not purely NSE and exercise therapy such as stretching alone, but there were additional physical agent modalities with the division of group 1 given physical agent modalities such as transcutaneous electrical nerve stimulation, ultrasound and infrared, group 2

given physical agent modalities + isometric and stretching, group 3 given physical agent modalities + neck stabilization exercises.

Based on this background, researchers are interested in conducting research on the different effects of providing neck stabilization exercises interventions with stretching without additional other interventions on non-specific neck pain in tailors who work in convection.

SUBJECTS AND METHOD

1. Study Design

This research is a randomized control trial design in the form of two group pre test and post test design at sevinta convection located in Malangjiwan Village, Colomadu District, Karanganyar, and Padi Emas convection in Gonilan Village, Kartasura District, Sukoharjo in November-December 2022.

2. Population and Sample

The target population of this study is tailors in convection who experience non-specific neck pain. The affordable population is convection tailors who experience non-specific neck pain in sevinta convection and padi emas. The sample was divided into two groups allocated randomly by taking a numbered paper roll. Group I was given neck stabilization exercise and group II was given stretching. The total samples from 25 people who meet the criteria as many as 24 people.

Inclusion criteria are: (1) there is pain in the neck for more than 3 months and work as a tailor for at least 1 year, (2) age 30-55 years, (3) female and male subjects, (4) found spasm in the superficial muscles of the neck, (5) willing to be a respondent and fill out inform consent. Exclusion criteria: (1) the subject has malignant disease, spinal stenosis, cervical fracture, osteoporosis, inflammatory rheumatism, (2) has a history of cervical surgery, (3) there is pain radiating to the arm.

3. Study Variables

Variables Dependent: functional ability of the neck in non-specific neck pain.

Variables Independent: neck stabilization exercise and stretching.

4. Operational definition of variables

Non-specific neck pain is discomfort felt in the back of the neck associated with prolonged static positions and working positions that often bow down, causing neck muscles to spasm, pain, limited LGS, decreased flexibility which affects the neck's daily functional abilities.

Functional ability of the neck is related to muscle flexibility, neck stability, normal joint range of motion and free from pain that affects daily activities and functional ability can be measured by the neck disability index (NDI).

Neck stabilization exercise is an exercise to activate the neck stabilizer muscles so that the neck is more stable and the overload of the superficial muscles will be reduced which will reduce spasm and improve neck function. The exercise procedure is in the form of chin tuck movements, cervical extension, shoulder shrug, shoulder roll, scapular retraction, which are directed by the researcher and then performed by the patient himself actively. Each movement is done for 15 repetitions.

Stretching is an exercise that aims to stretch muscles that are spasmed or tense. The stretched muscle will reduce tension and then increase muscle flexibility so that the effect is wider LGS and reduced pain so that the functional neck increases. The stretching technique performed is by stretching the SCM, scalene, upper trapezius, and levator scapula muscles held 8 seconds and relaxed again with 5 repetitions.

5. Study Instruments

The measuring instrument used is the neck disability index (NDI). The NDI is the most widely used instrument and a valid instrument for measuring neck functional ability in neck pain.

6. Data analysis

Data analysis was performed using IBM SPSS Statistics 26. Statistical tests used: (1) normality test using Shapiro Wilk test (sample <30), (2) homogeneity test using independent t test, (3) hypothesis testing in the neck stabilization exercise and stretching groups using paired t test, (4) test to determine the difference in effect between neck stabilization exercise and stretching groups using independent t test.

RESULTS

1. Univariate Analysis

Based on the data obtained from table 1 that gender is classified into 2 groups, namely in group 1 sex there are 3 male with a percentage of 25.0%, 9 female (75.0%), 2 male 1 group (8.3%), female 11 (91.7%).

Based on the data obtained from table 2, the ages in group 1 are (Mean= 41.67; SD= 6.15), (Min= 32; Max= 52), group 2 (Mean= 41.58; SD = 41.58), (Min= 32; Max= 52), length of work group 1 (Mean= 64.00; SD= 28.64), (Min= 36; Max=120), group 2 (Mean= 66.50; SD= 66.50), (Min= 24; Max= 300),

2. Bivariate Analysis

Based on the results in table 3, it shows that after the intervention the functional abilities of the neck in non-specific neck pain increased in both groups. neck stabilization exercises (Mean= 4.00; SD= 2.21) and stretching (Mean= 6.83; SD= 2.79), and were statistically significant ($p = 0.012$).

DISCUSSION

Non-specific neck pain can be defined as neck pain without a specific disease that

causes pain e.g. due to diseases such as rheumatism, osteoporosis, cancer, or radiculopathy not due to an abnormal anatomical structure is called non-specific neck pain (Tsakitzidis et al., 2009). The muscles in the neck have an important role in the stability and normal mobility of the cervical vertebrae. Muscle activity contributes about 80% to the stability of the cervical vertebrae (Panjabi, 1992). Neck pain is related to

fatigue of the superficial neck muscles because the downward position of the loading is on the neck and this muscle continues to contract for a long time. The cause of neck pain is due to muscular dysfunction such as decreased deep cervical flexor activity and increased activity of the sternocleidomastoides (SCM), anterior scalene, levator scapula and upper trapezius muscles (Falla, 2004).

Table 1. Sample characteristics (categorical data)

Characteristics		Category	Frequency	Percentage
Gender	Group 1	Male	3	25.0%
		Female	9	75.0%
	Group 2	Male	1	8.3%
		Female	11	91.7%

Table 2. (continue data)

Characteristics		Mean	SD	Min.	Max.
Age	Group 1	41.67	6.15	32	52
	Group 2	41.58	6.23	32	52
Length of work (month)	Group 1	64.00	28.64	36	120
	Group 2	66.50	82.64	24	300

Table 3. Results in increased functional ability of the neck after interventions

Variable	Pre test		p	Post test		p
	Mean	SD		Mean	SD	
Group 1	13.08	2.84	0.054	4.00	2.21	0.012
Group 2	10.83	2.55		6.83	2.79	

Neck stabilization exercises (NSE) aim to activate and control the muscles that control axial extension (cervical retraction) involving capitis flexion, slight straightening of the cervical lordosis curve and straightening of the upper thoracic kyphosis curve by maintaining the cervical spine in a neutral position. The deep cervical flexor muscles function for cervical retraction and provide segmental stability of the cervical spine. With the activation of the stabilizer muscle (deep cervical flexor) the cervical is more stable, over-contraction of superficial muscles will be reduced thus improving functional ability (Kisner & Colby, 2017).

Giving neck stabilization exercise can improve neck functional ability in non-specific neck pain according to the results of research conducted by Kaka et al., (2015) and Dusunceli et al., (2009). Neck stabilization exercise exercises aim to activate the neck stabilizer muscles (deep cervical flexors) which play a role in neck posture and reduce overactivity of superficial flexor muscles. Increased activity of superficial flexor muscles during high isometric and co-contraction of the SCM and anterior scalene muscles causes neck pain which affects functional ability (Falla, 2004). During exercise, the intrafusal and extrafusal fibers will continue to receive sensory impulses, which will be

sent and processed in the brain so as to determine the amount of muscle contraction required. Some of the responses sent will return to the extrafusal and activate the golgi tendon so that there will be an improvement in the coordination of intrafusal fibers and extrafusal fibers with afferent nerves in the muscle spindle, stimuli received by the neuromuscular junction will activate muscle fibers that will divide the pressure equally throughout the area so as to inhibit fibers to control tone (Kaka et al, 2015).

Stretching is one of the exercise therapies that can increase soft tissue extensibility, thereby increasing muscle flexibility and the scope of joint motion needed to achieve good functional ability by extending or lengthening shortened and hypomobile tissue structures (Kisner & Colby, 2012).

Giving stretching exercises can improve neck functional abilities in non-specific neck pain according to the results of research conducted by Tunwattanapong et al. (2016), Trisnowiyanto (2017) and Alfawaz et al. (2020). Stretching has an effect when the stretch force applied to the muscle will stimulate the muscle spindle and golgi tendon organ. Muscle spindle will provide information on changes in muscle length to the spinal cord to forward information to the brain or central nervous system. Muscle spindle will trigger the appearance of stretch reflex and then golgi tendon organ will be activated to inhibit the tension in the stretched muscle. Muscle stretching that is done for a long duration of time will cause the muscle spindle to adapt to the length. Inhibition of muscle contractile components by the golgi tendon organ plays a role in muscle relaxation during stretching maneuvers and when the muscle is stretched it allows the sarcomere components consisting of actin and myosin in the muscle to elongate, so that spasm decreases and the muscle is more

flexible which affects functional ability (Kisner and Colby, 2017).

The obstacles encountered in this study were that patients did not understand some of the items in the NDI questionnaire so that the researcher had to provide an explanation as to what was meant. The weakness in this study is the dominance of female subjects compared to men which will affect the results of the study. So the researcher suggests that further research can overcome the obstacles and weaknesses in this study.

Based on the results of this study, there is a significant difference between giving neck stabilization exercises and stretching to improve the functional ability of the neck in non-specific neck pain. Giving neck stabilization exercises and stretching has an effect on improving the functional ability of the neck in non-specific neck pain where neck stabilization exercises have more influence in improving the functional ability of the neck in non-specific neck pain. So that from the results of research that has been done, the results of this study can be applied to improve functional abilities in patients with non-specific neck pain conditions that have the same characteristics as the subject of this study.

AUTHOR CONTRIBUTION

Almas Khonsa Dekamelania was the main researcher who selected the topic, collected the research data, analyzed the data and wrote the research paper. Nur Basuki and Yulianto Wahyono analyzed and reviewed the research documents.

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CONFLICT OF INTEREST

There is no conflict of Interest in this study.

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