Effect of Cryotherapy Combined with William Flexion Exercise in Reducing Myogenic Low Back Pain

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ABSTRACT

Background: Health problems related to daily activities can be experienced by individuals or groups. The most common complaint in the musculoskeletal system is low back pain. Low Back Pain according to the Ministry of Health of the Republic of Indonesia in 2018 means pain that is felt in the lower back area, between the lowest costal angle to the sacrum. The purpose of this study was to determine the effect of adding cold pack therapy to the william flexion exercise on reducing pain in myogenic LBP patients.

Subjects and Method: This was an experiment study conducted at Dr. Moewardi Hospital, Surakarta, Central Java, in September 2022. Sample of 22 patients with myogenic low back pain was allocated into two groups. The dependent variable was pain. The independent variable was cryotherapy combined with William flexion exercise. Pain was measured using quadripel visual analogue scale. Mean between groups after intervention was analyzed using independent t test.

Results: Mean of pain in the intervention group (Mean= 6.27; SD= 1.00) was lower than control group (Mean= 7.09; SD= 0.94), and it was statistically significant (p<0.001).

Conclusion: Cryotherapy combined with William flexion exercise is better to reduce pain in patients with myogenic low back pain.

Keywords: low back pain myogenic, cryotherapy, William flexion exercise.

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BACKGROUND

Health problems related to daily activities can be experienced by individuals or groups. Non-ergonomic activities carried out every day will cause various complaints. The most common complaint in the musculoskeletal system is low back pain. Low back pain (LBP) according to the Ministry of Health of the Republic of Indonesia in 2018 means pain that is felt in the lower back area, between the lowest costal angle to the sacrum.

Engels' research (1996) found that based on a review of more than 80 papers on low back pain, every year the incidence of LBP in the world is between 40% -50%. Meanwhile a review of various studies conducted in Italy showed the prevalence of LBP within 12 months between 33% -86% occurred in nurses in Italy. A higher prevalence reported that from a study conducted in Turkey, the incidence of LBP in nurses was between 62% -88% (Karahan, 2009).

The prevalence of low back pain in the United States is reported to be 15%-45%

and the highest incidence is found at the age of 35 - 55 years (Tulder and Koes, 2001). Based on Copcord Indonesia (Community oriented program for controle of rhematic diseases) shows the prevalence of low back pain is 18.2% in men and 13.6% in women (Wirawan, 2004). Based on data obtained from the Data and Information Center of the Ministry of Health in 2012, the results of low back pain were ranked 6th out of the highest number of outpatient cases in class A government general hospitals in the East Java region with a total of 31,270 patients, while in hospitals class C general government hospital in East Java showed the results of cases of low back pain including the 7 most cases with a total of 5,137 patients.

Low back pain is rarely associated with mortality, but is one of the biggest causes of morbidity in the world. Low back pain is included in the top ten categories of causes of decreased quality of life as measured by disability adjusted life years (DALY). In America and England, low back pain is the biggest cause of work permits and costs around 100-200 billion per year causing economic losses due to the large number of LBP cases (Fuji and Tomoko 2013).

Low back pain is a disease that affects about 80% of individuals caused by various health problems, occurs due to the individual's body position when walking and standing in an upright position where most of the body's weight rests on the spine, namely the lumbar. Pressure on the lumbar causes tension in the ligaments and muscles in the lumbosacral.

Myogenic low back pain is an unpleasant sensory and emotional experience in the area between thoracic vertebra 12 to the bottom of the hip or anal canal that arises due to potential tissue damage, including: dermis, blood vessels, fascia, muscles, tendons, cartilage, bones, ligaments, meniscus, and bursa (Ismaningsih, 2019).

Myogenic low back pain is caused by muscle spasms which cause pain in the lower back, so the myogenic low back pain that is felt can also hinder a person's activities. The low back pain that farmers feel due to receiving static and repetitive loads for a long time can cause complaints in the form of damage to joints, ligaments and tendons (Suhardi, 2008).

LBP is caused by various abnormalities or pathological changes that affect various organs or tissues of the body. Some experts classify based on abnormalities or tissue. Macnab compiled a classification of LBP cited by Muttaqin (2013) as follows: (a) Viserogenic: LBP that is viscerogenic is caused by a pathological process in the kidney or viscera in the pelvic area, as well as retroperitoneal tumors, (b) Neurogenic: LBP that is neurogenic is caused by pathological conditions in the nerves that cause LBP, (c) Vasculogenic: Aneurysm or peripheral vascular disease can cause LBP or sciatica-like pain, (d) Psychogenic: Psychogenic LBP is generally caused by mental stress or anxiety, and depression, or a mixture of anxiety and depression, (e) Spondylogenic: Spondylogenic LBP is pain caused by various pathological processes in the vertebral column consisting of bone elements (osteogenic), intervertebralis discs (dicogenic), and myofascial (myogenic), and pathological processes in the sacroiliac join Cryotherapy is a therapy that uses cold agents to treat pain and reduce other symptoms of inflammation. In cold therapy, therapeutic modalities are used that can absorb tissue temperature resulting in a decrease in tissue temperature through a conduction mechanism (Swenson et al, 1996). Utilization of cold to treat pain and reduce other inflammatory symptoms. This cryotherapy modality can absorb tissue temperature, result-

ing in a decrease in tissue temperature through a conduction mechanism: absorbing calories from the local area of injury resulting in a decrease in temperature. In general, cold therapy at 3.5ºC for 10 minutes can affect temperatures up to 4 cm under the skin. Muscle tissue with a high-water content is a good conductor, while fat tissue is a temperature insulator, thereby inhibiting cold penetration (Ernst et al, 1994). Physiological and Therapeutic Effects of Cold Therapy Mechanism of cryotherapy. Physiologically, in the first 15 minutes after application of cold (temperature 10ºC) arteriolar and venule vasoconstriction occurs locally. This vasoconstriction is caused by reflex action of smooth muscle arising from stimulation of the autonomic nervous system and release of epinephrine and norepinephrine.

William flexion exercise is a type of exercise designed to open the intervertebral foramen and facet joints, stretch the hip flexor and lumbar extensor muscles, strengthen the abdominal and gluteal muscles and increase the mobility of the connective tissue in the posterior part of the lumbosacral joint. Lumbar flexion exercises are appropriate for reducing pain and increasing the range of motion of the lumbar joints in cases of low back pain (Borenstein and Wiesel, 2004). William flexion exercise is a type of exercise that consists of 6 forms of movement consisting of pelvic tilt, single knee to chest, double knee to chest, partial sit ups, hamstring stretch, hip flexor stretch, squats which are designed to open the intervertebral foramen and facet joints, stretch hip flexor and lumbar extensor muscles, strengthens the abdominal muscles and gluteal muscles and increases the mobility of the connective tissue of the posterior part of the lumbosacral joint (Borenstein and Wiesel, 2004).

SUBJECTS AND METHOD

1. Study Design
This was an experimental study conducted at Dr. Moewardi Hospital, Surakarta, in September 2022.

2. Population and Sample
The research subjects were taken from myogenic low back pain sufferers at RSUD Dr. Moewardi Surakarta in September 2022, with a total of 22 subjects. Then divided into 2 groups. The distribution is done according to the arrival of the patient. Patients who come first, third, fifth and so on get cryotherapy intervention and William flexion exercise while those who come second, fourth, sixth get intervention William flexion exercise.

3. Study Variables
The independent variables in this study were william flexion exercise and cold pack therapy. While the dependent variable in this study was a decrease in pain in patients with myogenic low back pain.

4. Operational definition of variables
Myogenic low back pain is pain around the lower back caused by disorders or disorders of the muscles and tendons without any neurological disorders. Determination of myogenic low back pain through a doctor's diagnosis, physiotherapy examination by measuring the degree of pain using QVAS with units of mm.

Cryotherapy, namely the use of cold thermal to reduce pain, which is applied at a temperature of 5-10 ºC for 15 minutes can affect the temperature up to 4 cm under the skin. William Flexion Exercise is an exercise to strengthen the muscles that flex the lumbosacral spine, especially the abdominal muscles and gluteus maximus muscles and stretch the muscles of the lower back extensor group.

Pain is an unpleasant sensory and emotional experience due to actual or potential ti-

ssue damage, which is measured using the QVAS unit in mm.

5. Study Instruments

The measuring instrument used in this study was the Quadruple visual analogue scale (QVAS) to measure the degree of pain in the subjects.

6. Data analysis

Mean difference between group after intervention was conducted using independent t test.

7. Research Ethics

Ethical clearance was obtained from the Health Research Ethics Commission Faculty of Medicine Muhammadiyah University Surakarta, No. 3570/B.2/KEPK-FKUMS/VI/-2021.

RESULTS

1. Univariate Analysis

Based on the data obtained, in group I it was found that the number of women was greater than the male group, namely the male

group was 18.2% while the female group was 81.8%. Then in group 2 the number of women was greater than the male group, namely the male.

Based on the data, it was obtained that the age of the elderly subjects was classified into 3 groups, namely in group I aged 36-45 years totaling 2 people, group II aged 46-55 years, group III aged 56-65 years totaling 2 people and group >65 years totaling 3 people, whereas in group II the William flexion exercise group in group I aged 36-45 years there were 3 people, group II aged 46-55 years totaled 1 person, group III aged 56-65 years totaled 3 people and group >65 years totaled 4 person.

2. Bivariate Analysis

Mean of pain in the intervention group (Mean= 6.27; SD= 1.00) was lower than control group (Mean= 7.09; SD= 0.94), and it was statistically significant ($p<0.001$) (Table 2).

Table 1. Sample Characteristics

Characteristics	Category	Frequency		Percentage	
		I	II	I	II
Gender	Male	2	5	18.2%	45.5%
	Female	9	6	81.8%	54.5%
Age	36-45 years old	2	3	18.2%	27.3%
	46-55 years old	4	1	36.4%	9.1%
	56-65 years old	2	3	18.2%	27.3%
	>65 years old	3	4	27.3%	36.4%

Table 2. Independent t test between groups after intervention

Variable	N	Mean	SD	p
Group 1	11	6.27	1.00	<0.001
Group 2	11	7.09	0.94	

DISCUSSION

This study found that cryotherapy combined with William flexion exercise is better to reduce pain in patients with myogenic low back pain. This result is in line with Setyawati et al. (2018) at Wongsonegoro Hospital in Semarang. They reported that the mean of postoperative pain scale after cold com-

presses on the lumbar vertebrae (Mean= 3.44) was lower than before (Mean= 5.31).

Harwanti et al. (2014) stated that William flexion exercise during 2 weeks reduces pain in low back pain patients. Utilization of cold to treat pain and reduce other inflammatory symptoms. This therapeutic modality can absorb tissue temperature, resulting in a decrease in tissue

temperature through a conduction mechanism: absorbing calories from the local area of injury resulting in a decrease in temperature. In general, cold therapy at 3.5°C for 10 minutes can affect temperatures up to 4 cm under the skin. Muscle tissue with a high-water content is a good conductor while fat tissue is a temperature insulator thereby inhibiting cold penetration (Ernst et al, 1994). Physiologically, in the first 15 minutes after application of cold (temperature 10ºC) arteriolar and venule vasoconstriction occurs locally. This vasoconstriction is caused by a reflex action of smooth muscle arising from stimulation of the autonomic nervous system and the release of epinephrine and norepinephrine so as to reduce William flexion exercise is designed to reduce low back pain by strengthening the muscles that flex the lumbosacral spine, especially the abdominal and gluteus maximus muscles and stretching the lower back extensor groups.

William flexion exercise is also called lumbar flexion exercise. Developed by Dr. Paul Williams in 1937 to treat patients with chronic back pain. The average patient who experiences back pain has degenerative bones. The goal of the William flexion exercise is to reduce pain and provide stability, by actively developing the abdominals, gluteus maximus, and hamstring muscles. This exercise will achieve the proper balance between the flexor and extensor groups of postural muscles.

AUTHOR CONTRIBUTIONS

Yoga Handita as the main character of the research who chooses the topic, conducts searches and collects data in this study, compiles research articles. Nurul Fithriati Haritsah played a role in conducting, data analysis and reviewing research documents, and Nur Basuki as the author of the research report.

CONFLICT OF INTEREST

There was no conflict of Interest

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