EFFECTIVENESS OF SLUMP AND STRAIGHT LEG RISING STRETCHING FOR PAIN AND FUNCTIONAL ACTIVITIES IN CHRONIC MYOGENIC LOW BACK PAIN AT RSU. ISLAM KLATEN: A CASE REPORT

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Abstract

Introduction: The slump test is a neurodynamic test to evaluate the mechanosensitivity of neuromeningeal structures within the vertebral canal. The straight leg raising (SLR) is a provocation test that evidences radicular irritation in the lumbosacral region by lower limb flexion and can be due to multiple causes. Active stretching effectively reduces pain and improves function in adults with LBP (first degree) in sub-acute and chronic phases.
Methods: This study was a case report that observed twelve patients with chronic LBP divided into two groups. Group 1 received slum and SLR stretching, while in the group 2 did not treated with stretching, however only got the SWD and TENS. The pain intensity and functional ability were evaluated after treatment by VAS and Oswestry scale respectively.
Objective: To determine the effectiveness of slump and SLR stretching for reducing pain and increasing ADL in patients with chronic myogenic LBP.
Results: Fifty patients with a diagnosis of chronic myogenic LBP, 12 patients met the inclusion criteria devided into 2 groups. 11 of 12 patients reported decreased pain and increased functional activity. There was a decrease in pain 9 points and an increase in the functional activity of 12.3% in the group 1. While in the group 2, there was a decrease in pain as 3 points and an increase functional activity 2.33% as well.
***Conclusion**:* Slump and SLR stretching can reduce pain and increase functional activity in chronic myogenic LBP patients, although the intervention was only given twice and few samples. Further research needs to be done by increasing the number of samples and training doses.

Keyword: Chronic myogenic LBP, slump stretching, SLR stretching, pain, and functional activity

Introductions

Myogenic LBP is a condition of activation of the network sensitive to pain in the muscles, especially in the muscles lumbar region locomotion, namely: (1) m. Rectus abdominis, (2) m. Obliques internal and external, (3) m. Psoas major, (4) m. Quadratus lumborum, (5) m. Interspinous, (6) m. Transversospinalis and m. Sacrospinalis is activated by spinal movement (1).

LBP prevalence is 60%-90%, with an annual incidence of 5% in both men and women. Approximately 80%-90% of humans are estimated to have experienced at least one episode of back pain in their lifetime. LBP causes job losses, and in recent years it has increased faster than any other disability (1).

The clinical course of chronic LBP is >12 weeks. Due to the high prevalence and high cost of treating chronic LBP, many studies have been conducted to prevent recurrence and transition of chronic LBP (2), (3).

LBP risk factors can be classified into individual, psychosocial, and occupational. The individual factors include obesity, age, smoking habits, low education level, high pain level, and disability. Psychosocial factors can be caused by stress, layoff anxiety, depression, negative emotions, low health quality, and unemployment. Work's risk factors caused by work are bending movements, lifting and carrying loads, static workplace, posture, work vibration, low work qualifications, monotonous work, uniformity in work, too low position activities, or too intense activities. Strenuous physical activity that is not related to work can also contribute to the emergence of pathological vertebrogenic processes and affect working performance (1), (4).

The slump test is a neurodynamic test used to evaluate the mechanosensitivity of neuromeningeal structures within the vertebral canal. This test aims to evaluate the effectiveness of slump stretching in reducing pain and increasing ADL in Chronic Myogenic LBP patients (5), (6).

Straight Leg Raising (SLR), also called the Lasegue test, is a provocation test that evidence radicular irritation in the lumbosacral region by lower limb flexion and can be due to multiple causes. Radicular symptoms are primarily produced by nerve root inflammation by surrounded structures. This test can be positive in various conditions, including lumbar disc herniation, facet joint cysts, or hypertrophy (7).

Active stretching can effectively reduce pain and improve functional activity in adults with first-degree LBP in sub-acute and chronic phases (2), (8). Furthermore, this study aimed to determine the effectiveness of slump and straight leg rising stretching for pain and functional activities in chronic myogenic low back pain.

Metode

This study had been approved by the Health Sciences Faculty, Universitas Muhammadiyah Surakarta (1292/C.8-III/FIK/VIII/2021).

Subject

The subjects of this study were patients with LBP, recruited from physiotherapy department, Islamic general hospital Klaten. The eligible patients who did not have neurogical disorders, fractures in the lower extremity, and no assistance for activity. Interventions were given to participants as Short Wave Diathermy (SWD), Transcutaneous Electrical Nerve Stimulation (TENS), slump stretching, and SLR stretching. There were two groups, each group consisted of 6 subjects. All groups received treatment SWD and TENS. The group 1 received additional slump and SLR stretching interventions. Data were collected twice, before the first treatment and after the second treatment, with an interval of 3 days. During the day intervals, the patient was asked to do stretching as a home program. The home program dose is the same as the intervention dose in the hospital.

The technique of slump stretching is described as (1) the patient sits on the edge of the examining bed (popliteal fossa is on the edge of the bed) with an upright sitting posture, 90° of hip flexion, and 90° of knee flexion, (2) shoulders and lower back are relaxed, (3) the physiotherapist maintains the cervical spine and head in a neutral position, (4) asked the patient to bend their back until reaching the limit of pain (thoracal and lumbar flexion). After that, the patient is asked to move the chin towards the chest and straighten one of the lower legs (knee extension and ankle dorsiflexion), (5) then asked to sit back in an upright position.

Subsequently, the procedures of SLR are as follow (1) the patient in a supine position, (2) Physiotherapist gently raises the patient's leg by flexing the hip with the knee in extension, (3) the test is considered positive when the patient experiences pain along the

lower limb in the same distribution of the lower radicular nerve roots (usually L5 or S1), (4) a positive SLR test is determined when pain is elicited by lower limb flexion at an angle lower than 45 degrees, (5) if the pain is reproduced during the leg straightening, patients usually request that Physiotherapist aborts the maneuver and by flexing the patient's knee, the buttock pain is usually relieved (7).

Measurements

The patient's age, gender, weight, height, type of work, duration of work, symptoms felt, and history of falls/trauma was recorded as patient characteristics.

Pain intensity was evaluated by the Visual Analog Scale (VAS). VAS is a scale from zero to 100 mm. The patient is asked to identify the location of the pain. The VAS is an easy and quick pain assessment to implement because it can be performed before, during, and after stretching to ensure optimal pain control for effective stretching. The reliability and validity of the VAS were declared acceptable in musculoskeletal disorders in the elderly.

The Oswestry Disability Index was applied in this study to measure functional activity. The Oswestry Disability Index consists of 10 functional activity assessment scales in the form of pain intensity, self-care, lifting activities, walking, sitting, standing, sleeping, sexual activity (if possible), social life, traveling/long trips with answer choices 0-5. The criteria for interpreting the results are as follows (1) 0-20% minimal disability, (2) 21-40% moderate disability, (3) 41-60% severe disability, (4) 61-80% crippled, (5) 81-100 % Patients are already very tormented by the pain that arises (felt) (9).

Physiotherapy Intervention Technology

In this study, all patients received SWD and TENS interventions. Two additional stretching intervention techniques were administered to the intervention group.

Although its effectiveness is lower than placebo treatment, Short Wave Diathermy (SWD) is the most widely applied intervention for LBP with the utilization of high frequency current. SWD uses a frequency of 27.33 MHz and a wavelength of 11 meters, this method can be connected with a condenser or induction coil technique. The condenser plate or bearing is connected to the machine. The skin is coated with a cloth and 1-2 inches

spaced with the electrodes, producing the highest temperature on the muscle surface. In LBP conditions, the inductive applicator can produce superficial muscle heating. SWD dosimetry is a comfortable heat sensation for the patient, applied to the lower back region for 15-30 minutes. SWD interventions before exercise therapy have been shown to increase articular range of motion and have a synergistic effect (10), (11).

Transcutaneous Electrical Nerve Stimulation (TENS) produces an analgesic effect with the gate control theory mechanism. TENS interventions can increase blood flow in muscles, destroy muscle metabolites, and reduce muscle soreness. Muscle blood flow is increased by vasoactive metabolites derived from muscle contraction. The electrical stimulation produced by TENS can alter blood flow (12), (13).

Slump stretching can reduce intraneural edema, restore pressure gradients, relieve hypoxia, and improve symptoms associated with neurogenic pain syndrome (14). Slump stretching can effectively reduce adhesions between nerve tissue (dura, dural sleeve, and nerve root) and surrounding connective tissue, reduce antidromic impulses generated in C-fibers at dysfunctional sites resulting in neuropeptide release and reduce inflammation in nerves innervated by nerves. However, this treatment can also increase local tension, producing irritation symptoms such as pain, burning, numbness, and tingling (15).

Patients were given active stretching intervention with 2 techniques. Pourahmadi describes the first technique in his research entitled the effectiveness of slump stretching on LBP. The slump stretching intervention technique is like the slump test with the additional resistance in 20-30 seconds at the end of the movement. The second stretching technique is SLR stretching. The patient is in a supine position and performs an active straight leg raise (SLR) movement. At the end of the movement, an additional resistance in the range of 20-30 seconds is given. Each stretching technique is performed 3-7 times, based on the patient's tolerance. Patients are given a home program in the form of stretching with the same technique and dose and education about the use of ergonomic positions during functional activities, especially when working.

Result

Women dominate in this study. The 50-60 year age group has a high population compared to the other two age ranges. Unfortunately, there was about obesity, and only

one patient had a normal body mass index. Physical activity or domain the majority worked in a standing position for 7 hours. The location of the symptoms is in the waist and thighs.

Tabel 1. Baseline characteristics of the participants

Characteristic	Group 1 (n=6)	Group 2 (n=6)
Age (yr), mean (SD)	52,7 ± 3,9	56,2 ± 4,2
Gender, n female (%)	83,33	100
Weight (Kg)	68,67 ± 5,2	69 ± 6,6
Height (cm)	156 ± 8,6	152 ± 2,5
BMI (kg/m2), mean (SD)	28,49 ± 3,9	29,89 ± 3,1
Physical activity /work domain (0 to 24)	6 ± 3,06	7,5 ± 2,1
Location of symptoms, n (%)		
Waist	33,33	66,67
Thigh	66,67	33,33

Of the 15 patients with a diagnosis of Chronic Myogenic LBP, 12 patients met the inclusion criteria with six patients as the experimental group being given SWD, TENS, slump, and SLR stretching and six patients as the control group being given SWD and TENS. 11 of the 12 patients reported decreased pain and increased functional activity. There was a decrease in pain of 9 point on the VAS scale and an increase in the functional activity of 12.3% on the Oswestry scale in the experimental group. While in the control group, there was a decrease in pain as much as 3 point VAS scale and an increase in functional activity as much as 2.33% on the Oswestry scale.

Tabel 2. Outcomes of treatments

Output	Result		Measuring instrument
	T_1	T_2	
Pain, mean (SD)	69 ± 0,79	60 ± 0,76	VAS
ADL (%), mean (SD)	68 ± 12	55,7 ± 9,9	Oswestry disability index
Pain, mean (SD)	62 ± 1,1	59 ± 1,09	VAS
ADL (%), mean (SD)	61 ± 12,8	58,7 ± 12,6	Oswestry disability index

Discussion

Many studies on SWD interventions in chronic LBP have been carried out, but their effectiveness has not been proven. This method is also economically not affordable. For this reason, SWD interventions are often replaced with Low-Level Laser Therapy (LLLT) or with interference current (11).

Many studies on TENS interventions to reduce chronic pain have been carried out. These studies gave the following results: reduced pain intensity, more safety (side effects), disability, increased health-related quality of life, decreased use of analgesic drugs (13).

According to this study, the combination of SWD, TENS, and stretching interventions proved to have a positive impact. Slump and SLR stretching appeared significantly reducing pain and increasing functional activity. Similarly, previous studies revealed that slump stretching, either given as a single intervention or in combination with other physical therapy interventions, can reduce pain levels, disability and increase ROM in patients with LBP (5).

Neurodynamic mobilization techniques are often used in clinical practice to restore nerve mobility. This technique can enhance excursions by flossing the nerves. Studies have found that nerve mobilization techniques reduce fibrosis and adhesion between nerve tissue and surrounding tissue and increase intrafascicular gliding (16). The transverse contraction of the nerve tissue by lengthening or stretching of the nerve tissue and the repeated elongation/relaxation of the transverse contraction can alter intrafascicular pressure. This change in intrafascicular pressure causes the pumping or flushing of intraneural fluid with repeated elongation/relaxation phases. The pumping effect can displace intraneural fluid, facilitate axoplasmic flow, and minimize the deposition of sensitizing chemicals, reducing pain and improving functional activity (14), (16).

In nerve mobilization, there are oscillatory movements such as stretching straight legs; there are temporary lengthening and shortening of nerves increased intra-neural pressure followed by periods of relaxation (7). This repetitive pumping action increases the spread of local inflammatory products around nerves, thereby reducing hypoxia and pain. Mahesh Mitra investigated this and found improvements in fluid dispersion in the feet has been found secondary to ankle plantarflexion and repeated dorsiflexion (7).

This study had some limitations, whereas we did not follow up pain symptoms

after stretching to know the appropriate effect of stretching. However, this study had good measurements; nevertheless, only two sessions of treatment in the hospital. It showed that stretching was beneficial to reduce pain and increase the quality of functional of patients.

Conclusion

Slum and SLR stretching can reduce pain and increase functional activity in chronic myogenic LBP patients.

Acknowledgment

I would like to thank to the great participants who were involved in this study. The special thank to our advisor Lect. Dwi Rosella Komalasari, M.Fis.,Sp.Vest for her guidance during this study.

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