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SPINAL MOBILIZATION WITH LEG MOVEMENT VERSUS TRACTION STRAIGHT LEG RAISE IN LOW BACK PAIN PATIENTS DUE TO HERNIA NUCLEUS PULPOSUS

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ABSTRACT
The purpose of this study was to compare the effectiveness of Spinal Mobilization With Leg Movement (SMWLM) and Traction Straight Leg Raise (TSLR) on limited range of motion and lumbar functional impairment in herniated nucleus pulposus patients. The research method is an experiment with a pre-test – post-test two group design. A total of 24 herniated nucleus pulposus patients were simply randomized into 2 groups, namely group I was given Mobilization With Leg Movement and group II was given Traction Straight Leg Raise. The results showed that the range of motion for group I obtained a value of p = 0.045 and functional lumbar with a value of p = 0.012. In group II, a value of p = 0.001 was obtained for range of motion and functional lumbar with a value of p = 0.001. The independent t-test obtained a value of p = 0.000 for range of motion and a value of p = 0.001 for lumbar functional value. Based on the findings of this study, SMWLM and TSLR have a significant effect on improving the range of motion and lumbar function in patients with herniated nucleus pulposus, but SMWLM is more effective than TSLR in increasing range of motion and lumbar function in patients with herniated nucleus pulposus.

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1. INTRODUCTION

Low back pain is one of the most common musculoskeletal disorders that causes limited range of motion and lumbar functional impairment [1]. Chronic low back pain is identified as the third most common cause of doctor visits[3]. One of the causes of low back pain is herniated nucleus pulposus (HNP) [2] due to compression of the spine due to degenerative processes, trauma or posture errors. Spinal compression will put pressure on the disc continuously and change the structure of the nucleus pulposus which causes a reduced ability to absorb spinal compression, resulting in prolapse of the nucleus pulposus which compresses the nerve roots which causes symptoms such as pain, paresthesia and weakness [4][5][6]

Clinical symptoms of Hernia Nucleus Pulposus (HNP) are intervertebral disc ruptures and around 60-80% cause lower back pain[7],[8] which affects the patient's quality of life and ability to work and causes the loss of many workers in the community. HNP accounts for about two-thirds of spinal pain diagnoses. L4-L5 and L5-S1 are the most frequently affected by herniation [9],[10], [11] and the pain radiates to the lower extremities [12]

Its prevalence is approximately 40% in the adult population and disc herniation is the cause [13]. In the United States, HNP is 1 of the 10 most common diseases with a prevalence ranging from 7.6-37% and is found at the age of 45-60 years. Globally, the prevalence of HNP ranges from 1-2% of the population. The most common age is 30-50 years, and is often found in the lumbar spine [12] and men are more than women [11], [14]

Nearly 60 to 80% of adults experience LBP at least once in their lifetime and nearly 80% of low back pain related to intervertebral discs may accompany radicular symptoms [14], even leg pain, incontinence or paraplegia in severe

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cases [15]. Lumbar HNP patients complain of increasing pain when sitting for a long time, bending over, lifting heavy objects, when coughing, sneezing, and straining. This case often occurs in elderly people due to trauma, fractures or osteoporosis in the intervertebral disc [16] and can cause limited range of motion in the sagittal plane. This is because during flexion, the disc protrudes more posteriorly which compresses the nerve roots. Besides that, it also limits hip flexion during straight leg raising (SLR) movements, because it causes tension in the sciatic nerve, causing back pain which is preceded by degenerative changes [17].

The goal of physiotherapy for lumbar disc herniation patients is to reduce pain and muscle spasm, restore flexibility to soft tissues, strengthen weak muscles, eliminate muscle imbalances, teach controlled movement adaptation, increase patient function and participation [18].

Spinal Mobilization With Leg Movement can benefit significantly in the range of motion straight leg raise and lumbar function because of the glide effect on the lumbar spinous process accompanied by a straight leg raise movement which can give the ischiadicus nerve freedom to move proximally and distally. The Mulligan traction leg raise technique is a painless intervention that has an immediate benefit in patients with low back pain with limited hip flexion ROM [19]. Therefore this study aims to compare the effectiveness of Spinal Mobilization With Leg Movement and Traction Straight Leg Raise on limited range of motion and lumbar functional disorders in herniated nucleus pulposus patients.

2. RESEARCH METHOD

Study design

The research design was a quasi-experimental with a pretest - posttest two group design. The research protocol was approved by the Makassar Health Research Ethics Commission.

Research subject

24 HNP patients who were the research subjects. simply randomly divided into group I: 12 people were given Spinal Mobilization With Leg Movement and group II: 12 people were given Traction Straight Leg Raise intervention. Inclusion criteria were positive HNP Straight Leg Raise test and Slump test with radicular pain, active – passive flexion and lateral lumbar flexion in a standing position with radicular pain, lateral shift test with radicular pain, and willing to be research respondents until it was completed. Exclusion criteria were obese HNP, complications of spondylolisthesis, spondylolysis and vertebral fractures.

The research procedure is as follows:

Starting with the pre test, namely measuring the range of motion straight leg raise [20] with a goniometer [21] and functional lumbar with the Oswestry Disability Index [22], [23] in 24 research subjects

1. Carry out spinal mobilization with leg movement by lying the patient sideways, the physiotherapist is next to the patient with both thumbs placed beside the ipsilateral spinous process, then the physiotherapist performs a transverse slide on the spinous process while the patient's leg is asked to move actively towards flexi-extension during 3 sets, 8 reps and 8 interventions for each study subject.
2. Implementation of SLR traction by means of the patient lying supine, the physiotherapist beside the patient with one hand the physiotherapist holds the proximal part of the patient's ankle, assisted by the physiotherapist's elbow, then the physiotherapist performs a longitudinal glide on the axis of the femur by stretching the knee and leaning backwards. While maintaining the longitudinal glide, move the patient's leg passively and gently into pain-free range in the Straight Leg Raise position[24]. Do 3 sets, 8 repetitions, held 10 seconds per repetition with a total of 8 interventions.

Post test

After the treatment was carried out on 24 research subjects, range of motion and lumbar functional abilities were measured.

Data analysis

Independent t-tests were used to compare the effects of the two interventions while paired t-tests were used to determine whether changes in outcomes were affected by the interventions with a significance level of $p < 0.05$. Statistical analysis was performed using SPSS statistical software.

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3. RESULTS AND ANALYSIS

Table 1 Lumbar Range of Motion and Functional Measurements

Group I	Pre	Post test	t	p
Range of motion	45,33±3,830	73,33±3,011	-31,305	0,045
Lumbar functional	21,33±4,926	10,00±2,280	9,220	0,012
Group II				
Range of motion	45,17±6,969	60,83±7,139	- 23,500	0,001
Lumbar functional	19,00±4,899	13,83±3,710	8,598	0,001

Table 2 Lumbar Range of Motion and Functional Measurements between groups

Data	Group I	Group II	t	p
Range of motion	28,00 ± 2,191	15,67 ± 1,633	11,056	0.000
Lumbar functional	11,33 ± 3,011	5,17 ± 1,472	4,507	0.001

4. DISCUSSION

The results of this study indicate that Spinal mobilization with leg movement and Traction straight leg raise have an effect on increasing range of motion and functional lumbar study subjects (table 1). This means that both groups show improvements in increasing range of motion and increasing functional movement, because SMWLM reduce leg and back pain, increase range of motion and improve lumbar disability in the short and long term [22]. According to B. Ashraf et al (2021) SMWLM as an addition to nerve mobilization and conventional therapy shows much better results in pain, lumbar functional disorders and range of motion when compared to conventional therapy or nerve mobilization and conventional therapy. [25] besides that SMWLM is more effective in increasing the range of motion.[26]

Pain in low back pain sufferers can decrease due to the mechanical effect of the given mobilization in the form of oscillatory movements. This movement can increase the secretion of endorphins which can reduce pain and also stimulate the receptor mechano associated with myelin alpha beta and alpha beta fiber. The myelin fibers send impulses faster and then the pain impulses transmitted by the C fibers are blocked or modulated [27]. Posteroanterior mobilization of the Lumbar Spine has both mechanical and neuro-physiological effects. Passive movement that is given selectively will stretch the contracted tissue by increasing movement [28]. Various Mulligan techniques, such as apophyseal slides and spinal mobilization with limb movement, have the effect of relieving tension on the facet joint capsules, which can reduce the painful sensation experienced by low back pain patients [29] and traction has been shown to increase the range of motion in a straight leg raise. and reduce pain [19].

In table 3. Spinal mobilization with leg movement is more effective than traction straight leg raise in increasing range of motion and lumbar function in patients with Hernia nucleus pulposus. The advantage of SMWLM is that when the glide rotation is performed, the intervertebral foramen space opens so that the nerve roots are free from pressure and also produces greater hypoalgesia than other exercises. This manipulation inhibits pain in the dorsal horn of the spinal cord by altering nerve neuroplasticity and central sensitization and providing a stimulus that acts as a counter-irritant to pain. In addition, it can correct spinal position errors and reduce pain through neurophysiological mechanisms, relieve symptoms that radiate to the lower limbs and increase the range of motion in the hypomobile segment and mobilize the spine with foot movements more effectively than sliding neurodynamic techniques to improve function in radicular leg pain [30]

5. CONCLUSION

Based on the findings of this study, SMWLM and TSLR have a significant effect on improving the range of motion and lumbar function in patients with herniated nucleus pulposus, but SMWLM is more effective than TSLR in increasing range of motion and lumbar function in patients with herniated nucleus pulposus.

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