The Comparative Effects of Butler's Neural Tissue Mobilization and Mulligan's Bent Leg Raise in Patients with Chronic Lumbar Radiculopathy

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Author`s Contribution

[1] Conception and design, [2,1] Collection and assembly of data, [2] Analysis and interpretation of the data, Final approval and guarantor of the article [3] Critical revision of the article for important intellectual content, Statistical expertise,

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ABSTRACT

Objective: To compare the outcomes of Mulligan leg lift and Butler neural tissue mobilization in individuals with persistent lumbar radiculopathy.

Methodology: It was a randomized control trial study with non-purposive sampling. 62 participants who visited the physiotherapy department were evaluated and screened for chronic lumber radiculopathy. These patients were randomly assigned to two groups, A and B, using a computer-generated algorithm. Prior to including them in the study, take into account the inclusion and exclusion criteria. Informed consent was obtained from them in writing, whether they were willing to participate or not. Both groups received the same conventional therapy throughout the study. Group A patients were treated with the Butler neural mobilization technique, while Group B patients were treated with bent leg mobilization Technique.

Results: According to the NPRS results, group A means and standard deviations after treatment were 4.34±0.48, functional disability was 18.89±2.16, lumber flexion was 31.3±3.54, extension was 8.48±8.71, SLR was 62.41±3.92 and Schober test was 9.31±0.80. In group B, the mean and standard deviation of the NPRS were 2.46±5.0, the functional disability was 9.28±2.90, the lumber flexion was 45.71±3.52, the lumber extension was 13.14±1.95, the SLR was 83.35±2.07, and the Schober test was 13.6±1.38 with p-value 0.00, which was less than p 0.05.

Conclusion: Both techniques were effective for lumber radiculopathy but bent leg mobilization was more effective than Beutler neural mobilization.

Keywords: SLR, NPRS lumber radiculopathy, Schober test, Butler neural mobilization,

Introduction

Pain in hip and back region is known as lumbosacral radiculopathy that is radiate from back of thigh to leg. This damage occurs because the nerve roots that leave the spine are compressed at L1-S4 level. Symptoms related to this are radiating pain, tingling, paresthesia, numbness and shooting pain. Lumbosacral and cervical radiculopathy are most common occurred in spine, and thoracic radiculopathy ration is not common.[1] Radical pain is often secondary to spinal nerve compression or inflammation. When the agony radiates to the calf or foot on the back of the body, it is called a sciatica in lay terms. This form of pain is always deep and constant and will normally reproduce in certain conditions and movements, for example sitting or walking.[2] It is more common in males as compared to females and it mostly effect at the age of 40 years. Further risk features consist of frequent lifting, driving occupations, heavy industry work, taller height, back trauma, smoking, sedentary lifestyle, overweight, multiple pregnancies, chronic cough and overweight. Environmental aspects include sciatica, herniated discs.[3,4] "Wear and tear" Inflammation, or trauma usually causes lumbar radiculopathy due to nerve

compression. The rest of the cases include herniation of the intervertebral disc, cysts, and narrowing of the back canal. The tumour or infection are other unusual causes. A physicist, physiotherapist has advanced qualifications for the diagnosis and treatment of lumbar radiculopathy.[5] Even though epidemiological studies fluctuate, the occurrence of low back ache and is predicted to be everywhere among 5% or more than 30 percent with a lifetime frequency of 60%-90%. About 50% of these conditions resolve in the duration of1-2 weeks. 90% of such patients resolve in 6-12 weeks. The low back pain differential is wide and among other analyses should contain radiculopathy of lumbar region.[6] X-rays may be used to screen complications like fractured bone or fracturing, osteoporosis, and irregular spine curvature. In the case of recovery that does not improve complications and surgery, magnet resonance imaging (MRI) and computed topography (CT) scans are used. The electric action of the muscles can be recorded by electromyography studies (EMG), the Nervous Conduct Studies (NACS), to aid in confirmed diagnostic activity, to detect affected nerves and the occurrence of new trauma. Medicine injections can be used to classify the involved nerves and to exclude other sources of pain.[7]

Most patients (70%-80%) report pain and injury relief in 4-6weeks of lifestyle changes, and surgery is only necessary for 1%-10% of patients. Management of rehabilitation stresses return to action so bad results are associated with lengthy periods in return for daily activities than required. Changes to the activity are recommended to be as involved as possible without discomfort. Heat, ice, electric boost, and medicines such as NSIDs and acetaminophen are often used for non-steroidal anti-inflammatory treatment. It is beneficial to exercise in stabilizing the trunk as well as stabilize the upper to lower body and increase endurance.[8] In certain patients with acute or subacute complications, epidural steroid injections or operations are used to relieve inflammation and alleviate pain. Acupuncture, chiropractic manipulations, massage therapy, spinal cord relaxation, or spinal cord decompression may relieve chronic pain. A doctor is willing to develop a treatment plan that meets the needs of the patient and coordinates the treatment with the patient, the health care provider, and the psychiatrist.[9,10]

This compression led to tingling sensation, numbness, radiating pain, or shooting pain and paresthesia. It may affect any region of the spine but mostly it occurs in lower back and in cervical region. Pain in lumber region is called lumber radiculopathy and in cervical region known as cervical radiculopathy. It rarely occurs in mid of spine.[11] The purpose of this research was to study and compare neural mobility and traditional therapy efficacy in patients with low back pain. And they end up their study with the result that passive SLR sciatica nerve mobilization show more significant result as compared to patients who receive conventional therapy management.[12]

In neurodynamic neural mobilization is a technique that is passive and applied by the therapist to decrease mechanical intrusions with the peripheral nerve biomechanics and neural mobilization helpful in improving the efficiency of nerve in both physiological and mechanical.[13] Neural mobilization of Butler is a method for neural mobilization used in reference to nervous system pathologies. Successful intervention was identified for some disorders like neck pain, carpal tunnel syndrome and low back pain.[14] Pain is a disgraceful physical and emotional sensation synonymous with real or possible tissue injury. Acute pain lasts a brief period of time and happens during surgery, accident or other disease. It warns the body that they are looking for assistance.[15]

Methodology

Recurrent lumbar radiculopathy was taken into account and confirmed in those who came for the physiotherapy treatment. These patients were assigned by computer-generated process in two groups: group A and group B. Prior to the analysis, take into account the requirements for inclusion and deletion. They have received informed consent whether they are ready to take part in writing. The traditional treatment was obtained by both classes and remained the same throughout the whole research. The traditional treatment includes 10 minutes of hot pack and exercise.[16] Patient in A group is treated with Butler neural tissue mobilization and in B group Mulligan bent leg raise is applied for pain, functional activity and SLR. Total 8 sessions were given to the patients (2 sessions per week). And session was conducted for 4 weeks. Assessment was taken at

baseline, after the treatment. Group A were Given Butler neural tissue mobilization; Patient was in supine position. Therapist's position was standing and facing towards the patient position and positioned one hand beneath the ankle to prevent pressure on peripheral nerves and the second hand above the patella. The knee was in extended position, and hip was flexed position in one plane and the leg was take to the point where symptoms was reproduced.[17] Group B were given Mulligan bent leg raise Technique; the therapist was positioned on the patient's restricted SLR side. Patients' bent knees were maintained over the therapist's shoulder. Therapist instructed patient to push her away with patient's leg and then relax. At this point therapist extended the patient's bent knee up as far as possible in the direction of patient's ipsilateral shoulder provided there was no pain. If it was painful the direction was altered by taking the leg more medially or laterally.

Data was entered through SPSS version 26. Quantitative variables like age were presented as mean and SD. Qualitative variables like gender was presented as frequency & percentages. Normality of data was, be checked if the data was following the normal data distribution curve than parametric test independent t-test and paired test was applied. If the data do not follow the normal distribution curve than non-parametric curve was used. The p<0.05 was considered significant.

Results

The calculated sample size for each group was n=52 patients. However, when a 20% drop out rate is factored in, the actual sample size in each group is n=62 (31 patients). The sample size was determined by using a 90 percent confidence interval, an 80 percent power test, and the expected VAS mean and standard in the study. ''effect of butler neural tissue mobilization and bent leg raise on pain and SLR in patients with low back pain" in groups A 1.31±0.87 and B 1.87±0.74[18]

There were a total of 29 Group A patients (patients treated with Butler neural mobilization) who participated in the study, with a mean age of 37.58±4.93 years. Likewise 28 patients enrolled in Group B, with a mean age of 38.714±4.3704. In Group A the males participants were 13 and females were 13 and in Group B

the males participants were 13 and female were 16. The NPRS results showed that in group A, the pretreatment mean and standard deviation was 7.62±1.4938 and the post treatment mean and standard deviation was 4.34±5.4837, functional disability pretreatment was 28.897±2.1604 and the post treatment was 18.897±2.1604, lumber flexion pretreatment was 21.37±3.5498 and the post treatment was 31.37±3.5498, lumber extension pretreatment was 5.207±2.0068 and the post treatment was 8.483. In group B, NPRS means and standard deviations were 7.71±0.4600 before treatment and 2.46±4.5079 after treatment, functional disability was 30.929±3.1614 before treatment and 9.286±2.9041, lumber flexion was 22.321±4.8078 before treatment and 45.714±3.5262 after treatment, lumber extension was 5.929±2.0171 before treatment and 13.143±1.9572 after treatment. Which was less than p0.05, indicating that both techniques were effective for managing lumber radiculopathy patients, but patients treated with the Bent leg mulligan technique showed statistically and clinically significant results when compared to Group A patients. (Table I) Paired test within the group; NPRS results showed that in group A, the mean and standard deviation pretreatment was 7.621±0.4938 and post treatment was 4.345±0.4837, functional disability pretreatment was 28.897±2.1604 and post treatment was 18.897±2.1604, the mean and SD of lumber flexion pretreatment was 21.37±3.5498 and post treatment was 31.37±3.5498, and lumber extension pretreatment was 5.207±2.0068 and post treatment it was 8.483±0.8710, which was less than p0.05, indicating that both techniques were effective for managing lumber radiculopathy patients, but patients treated with the Bent leg mulligan technique showed statistically and clinically significant results when compared to Group A patients.

Table I: Showing the Results of Pre and post Treatments mean and standard Deviation of NPRS, FD, LF, SLR and Schober

Variable	Pretreatment Mean ± SD	Post treatment Mean ± SD	P-value
NPRS	7.71±.46	2.46±.50	0.00
Functional Disability	30.92±3.16	9.28±2.90	0.00
Lumber Flexion	22.32±4.80	45.71±3.52	0.00
Lumber Extension	5.92±2.01	13.14±1.95	0.00
SLR	43.3±7.82	83.35±6.20	0.00
Schober	6.0±.76	13.67±1.38	0.00

Paired test within the group; NPRS results showed that in group A, the mean and standard deviation pretreatment was 7.621±0.4938 and post treatment was 4.345±0.4837, functional disability pretreatment was 28.897±2.1604 and post treatment was 18.897±2.1604, lumber flexion pretreatment was 21.373±0.5498 and post treatment was 31.373±0.5498, and lumber extension pretreatment was 5.207±2.0068. SLR pretreatment was 5.207±2.0068 and post treatment was 62.414±3.9235, Schober test pretreatment was 6.207±0.9403 and post treatment was 9.310±0.8064 with p-value 0.00 which was less than p0.05, indicating that these techniques were effective for managing lumber radiculopathy patients statistically and clinically. Within-group paired sample t-test results Group B NPRS means and standard deviations were 7.71±0.4600 pretreatment and 2.464±0.5079 post treatment, functional disability was 30.929±3.1614 pretreatment and 9.286±2.9041, lumber flexion was 22.321±4.8078 pretreatment and 45.714±3.5262 post treatment, The lumber extension pretreatment was 5.929±2.0171 and the post treatment was 13.143±1.9572, the SLR pretreatment was 43.393±7.8237 and the post treatment was 83.357±6.2076, and the Schober test pretreatment was 6.00±0.7698 and the post treatment was 13.679±1.3892 with p-value 0.00, which was less than p 0.05, indicating that both techniques were effective for managing patients with lumber radiculopathy.(Table II)(Figure 1)

Discussion

Chronic lumbar radiculopathy is a pathology characterized by pain in the lower back and hip region that radiates into the leg via the back of the thigh. This impairment occurs as a result of spinal nerve compression from the L1-S4 levels of the spine.[19] This compression caused tingling, numbness, radiating or shooting pain, and paresthesia. It can affect any part of

Table II: Showing the Comparing statistics results of pain, functional disability, lumber flexion/extension, SLR and Schober test in group A participants.

| Group			Mean	N	Std. Deviation	Std. Error Mean
		Paired Samples Statistics				
Bent Leg	Pair 1	Pain Pre	7.71	28	0.46	0.08
		Pain Post	2.46	28	0.50	0.09
	Pair 2	Funcational disability pre	30.92	28	3.16	0.59
		funcational disability post	9.28	28	2.90	0.54
	Pair 3	SLR pre	43.39	28	7.82	1.47
		SLR post	83.35	28	6.20	1.17
	Pair 4	Flexion ROM Pre	22.32	28	4.80	0.90
		Flexion ROM post	45.71	28	3.52	0.66
	Pair 5	Extension Pre	5.92	28	2.01	0.38
		Extension Post	13.14	28	1.95	0.36
	Pair 6	Schober Pre	6.00	28	0.76	0.14
		Schobar Post	13.67	28	1.38	0.26
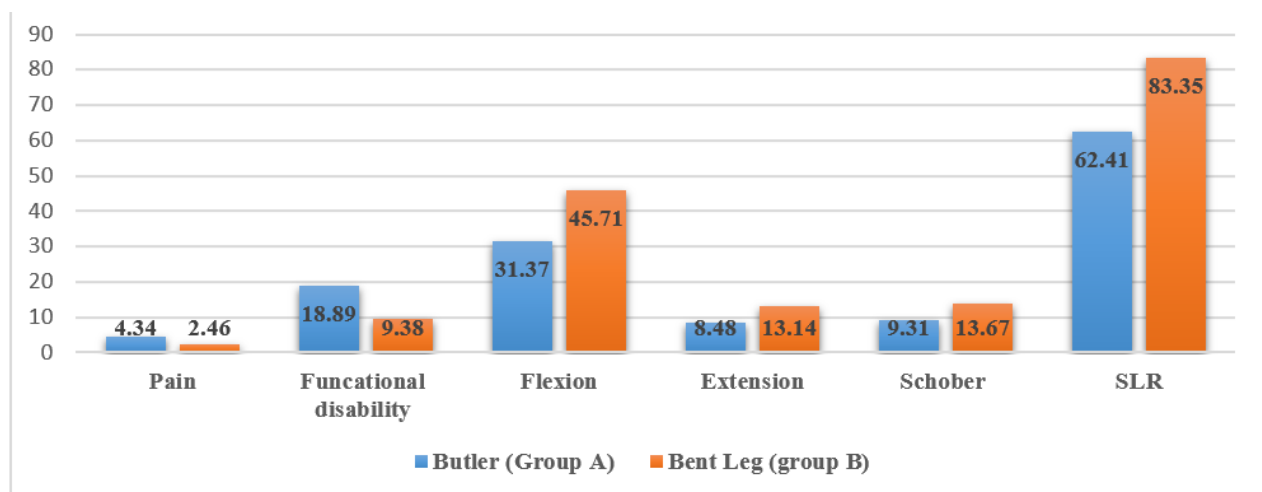
Figure 1: Showing the comparison of pain, functional disability and lumber movement in both groups

the spine, but it most commonly affects the lower back and cervical region. Lumber radiculopathy refers to pain in the lumber region, while cervical radiculopathy refers to pain in the cervical region. It is uncommon in the middle of the spine. [20]

There is a gap in the literature comparing Butler neural tissue mobilization and Mulligan bent leg raise in lumbar radiculopathy patients. As a result, the purpose of this study is to fill a gap in the literature. Butler neural tissue mobilization with bent leg raise has been used for assessing pain, ROM, and functional activity in chronic lumbar radiculopathy, according to the author's knowledge. However, these techniques have not been tested on a population under study, such as lumber radiculopathy. This gap in the literature suggests that the effects should be compared. It aided clinical decision making in determining the best treatment option for lumbar radiculopathy. Gajendrakumar Patel carried out a randomized controlled trial. The study's goal was to see how mulligan bent leg and slump stretching helped backache patients. This study was conducted on a subject with low back pain who was physically active. They were assigned to the same classes at random. Pre-test measurements were taken for both classes of passive SLR and pain. Group A received Mulligan BLR for four weeks, while Group B received slump stretching. After four weeks, the results were nearly identical to the pre-test assessment. The findings show that both MBLR and SLUMP technology are effective in pain reduction and PSLR ROM modification. However, patients in the MBLR group have better pain and ROM in pain than patients in the SLUMP group. According to the current study's findings, MBLR technology significantly reduces pain while improving PSLR ROM and preventing slumping. The MBLR technique may have mobilized intense, sensitized nervous tissues, resulting in a reduction in pain and PSLR. And they found that the mulligan bent test technique was more effective for pain and functional activity in low backache than slump stretching. [21]

Subarna Das Ms et al. and his colleagues carried out a randomized control trial study. The study's goal was to see if adding leg movement with spinal mobilization to neural mobilization and conventional therapy would provide better results in patients than traditional or neural mobilization therapy and conventional treatment. Ninety lumbar radiculopathy patients were chosen at random. The thesis took six weeks to complete. The study had three groups: a control group that did background and hot pack exercises, an experimental group that did neural mobilization with traditional physiotherapy, and an experimental group that did neural physiotherapy and SMWLM.[16]

The outcomes were evaluated on Day 1 and 2, 4, 6, and 8 weeks with NPRS, SLR using goniometry, and MOLBPQ. ANOVA was used for the intra-group study, and a paired t-test was used. All three groups improved in terms of discomfort, physical weakness, and straight leg lifting: (SLR). SMWLM has significantly improved pain, physical injury, and SLR outcomes when compared to traditional therapy and neural mobilization and conventional therapy as a complement to neural mobilization and conventional therapy. And they discovered that when treating patients with lumbar radiculopathy, spinal mobilization produces more significant results than conventional therapy or neural mobilization. The above-mentioned literature backs up our study findings. The mean age of Group A patients treated with Butler neural mobilization in this study was 37.586±4.9390, and 29 patients were enrolled in the study. The age mean in group B was 38.7144.3704, and 28 patients were enrolled in the study. In Group A, there were 13 males and 16 females. In group B, there were 15 males and 13 females. Some literature contradicts our study's findings. Mohammad Reza Pourahmadi and a colleague conducted a systematic review study. The goal of their research was to evaluate the efficacy of mulligan mobilization in lumber pain. Scopus, PubMed/Medline, Ovid, Embase, Cinehl, Cochrane Library, and Google Scholar have been searched for randomized clinical studies that reported results of pain or weakness in adult (18 years) patients with low back pain since the beginning of March 31, 2018. Two writers screened the findings and extracted data for this analysis. The likelihood of distortion was determined using the Cochrane guidelines. The fundamental knowledge and treatment protocols have also been extracted. Furthermore, for each study, the degree of proof and endurance for pain and injury have been calculated. For 693 patients, 20 study sessions were included. There were nine studies based on sustained

normal apophyseal joint, three studies based on limb-moving spinal mobilization, and seven studies based on bend leg raising. The results showed that mulligan strategies would reduce pain and disability and improve movement range in low back pain patients; however, the pain and disability tendency to conclude was mild. Furthermore, the effectiveness of Mulligan technology on travel speed was not conclusively determined. In this study, eight studies were classified as having a low risk of prejudice, while 12 studies were classified as having a high risk of prejudice. In their study, they conclude that the current literature is insufficient to support the effect of mulligan techniques in the lumbar spine for pain and functional activities.[22]

Their outcome was pain and range of motion, and they used a VAS (visual analogue scale) for pain and a goniometer for ROM. Data was collected before, during, and after each treatment session for a total of 24 hours. Within group treatment session P0.05, and between treatment group P>0.05, and they conclude in their study that these both techniques were effective for reducing pain and increasing range in SLR within the group, but both techniques show equal results. [18]

Conclusion

This study concluded that both techniques were effective for managing patients with lumber radiculopathy, but the bent leg raise mulligan technique outperformed the butler neural mobilization technique in terms of decreasing pain, increasing range of motion, and decreasing functional disability.

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