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EFFECTIVENESS OF NEURAL TISSUE MOBILISATION ON PAIN, PAIN FREE PASSIVE SLR RANGE OF MOTION AND FUNCTIONAL DISABILITY IN LOW BACK ACHE SUBJECTS WITH SCIATICA

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ABSTRACT

Background: Low back pain is a common, benign, and self-limiting disease that affects almost all persons, with a lifetime prevalence of up to 84%. In contrast, sciatica affects only 40 % of all persons in the Western industrialized countries. In sciatica, pain radiates down the legs, below the knee along the distribution of sciatic nerve. Nerve root compression is the most common cause of sciatica. Neuro dynamics or Neural Tissue Mobilization is relatively new approach in treatment of neuro musculoskeletal disorders. The aim of the study to determine the effectiveness of Neural Tissue mobilization on pain, pain free passive SLR ROM & functional disability in LBA subjects with Sciatica. Objective of the study is to study and compare the effectiveness of Neural tissue mobilization in LBA subjects with sciatica in terms of pain, pain free SLR ROM and Oswestry Disability Index.

Methods: 30 subjects were selected by simple random sampling and assigned in to Control(n=15) & Experimental group(n = 15). The subjects in control group were given conventional physiotherapy and those in Experimental group were given Neural Tissue Mobilization in addition to conventional therapy. All the participants were assessed with VAS, ODI and pain free passive SLR ROM.

Results: After the analysis, the results were found to be significant improvement in pain, pain free SLR ROM, ODI in both groups ($p < 0.00$). But there is a high significance in Experimental group when compared to control group.

Conclusion: Results suggest that NEURAL TISSUE MOBILIZATION along with conventional therapy is more effective in reducing pain, decreasing disability and improving SLR ROM.

Keywords: NTM, sciatica, Oswestry Disability Index, Universal Goniometer, Low Back Ache, Intermittent Lumbar Traction.

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INTRODUCTION

Low back pain (LBP) is a common and disabling disorder in the modern society.¹The lifetime prevalence of low back pain is reported to be more than 70% in industrialized countries (1-year prevalence, 15% to 45%; adult incidence, 5% per year) with varying degrees of symptom severity. A total of 266 (39.5%) patients reported low back pain and 166 (24.6%) reported sciatica.²

The ancient Greeks were familiar with sciatic neuralgia and used the term 'sciatica', to describe pains or 'ischias' felt around the hip or thigh. Hippocrates himself referred to 'ischiatric' pain affecting men between 40 and 60 yr .The Italian anatomist Domenico Cotugno (1736–1822) wrote the first book on sciatica in 1764 and for many years it was known as Cotugno's disease.³

Sciatica is known by a range of terms in the literature, such as lumbosacral radicular syndrome, radiculopathy, nerve root pain, and nerve root entrapment or irritation. Sciatic neuralgia is defined as 'pain in the distribution of the sciatic nerve due to pathology of the nerve itself'.^{3,4,5}

In sciatica, pain radiates down the legs, below the knee along the distribution of sciatic nerve. Sciatica usually related to the mechanical pressure & inflammation of the lumbosacral nerve roots.⁶ Prevalence of sciatic symptoms did not differ between males and females (Kelsey & Ostfeld, 1975). It was 5.1% for men and 3.7% for women aged 30 years or over (Heliovaara et al., 198 and AHCPR, 1994).⁶

Compared with other approaches in the treatment of neuro musculoskeletal disorders neuro dynamic or neural tensions tests are relatively new, only entering manual therapy with significance from the 1970s onwards (Grieve, 1970; Elvey, 1979; Maitland, 1979; Kenneally et al., 1988; Butler, 1991, 2000; Shacklock, 1995a, b,2005).⁷

Neuro dynamics is now a more accepted term referring to the integrated biomechanical, physiological and morphological functions of the nervous system .Neural mobilization is used for treatment of adverse neuro dynamics, the primary role is to restore the dynamic balance between the relative movement of neural tissues & surrounding mechanical interfaces, thereby allowing reduced intrinsic pressures on the neural tissue & thus promoting optimum physiological function.⁸

Previous studies focused on traditional physiotherapy programme & only few studies done

on neural mobilization. Conventional therapy approach helps in relieving the compression of nerve by increasing the space of intervertebral foramen so this therapy emphasizes with management of centralized pain than peripheral pain. So there is a need to manage both centralized & peripheral aspects of pain which if left untreated leads to chance of recurrence. So current study focuses on effectiveness of neural tissue mobilization in LBA subjects with sciatica therapy in LBA subjects with Sciatica on pain, passive SLR & functional disability.

Neurodynamics get altered in LBA with sciatica i.e., relative movement of neural tissues & surrounding mechanical interfaces get decreased with increasing intrinsic pressure on neural tissue, decreased neural vascularization & axoplasmic flow.

Conventional therapy approach helps in relieving the compression of nerve by increasing the space of intervertebral foramen so this therapy emphasizes with management of centralized pain than peripheral pain. So there is a need to manage both centralized & peripheral aspects of pain which if left untreated leads to chance of recurrence.

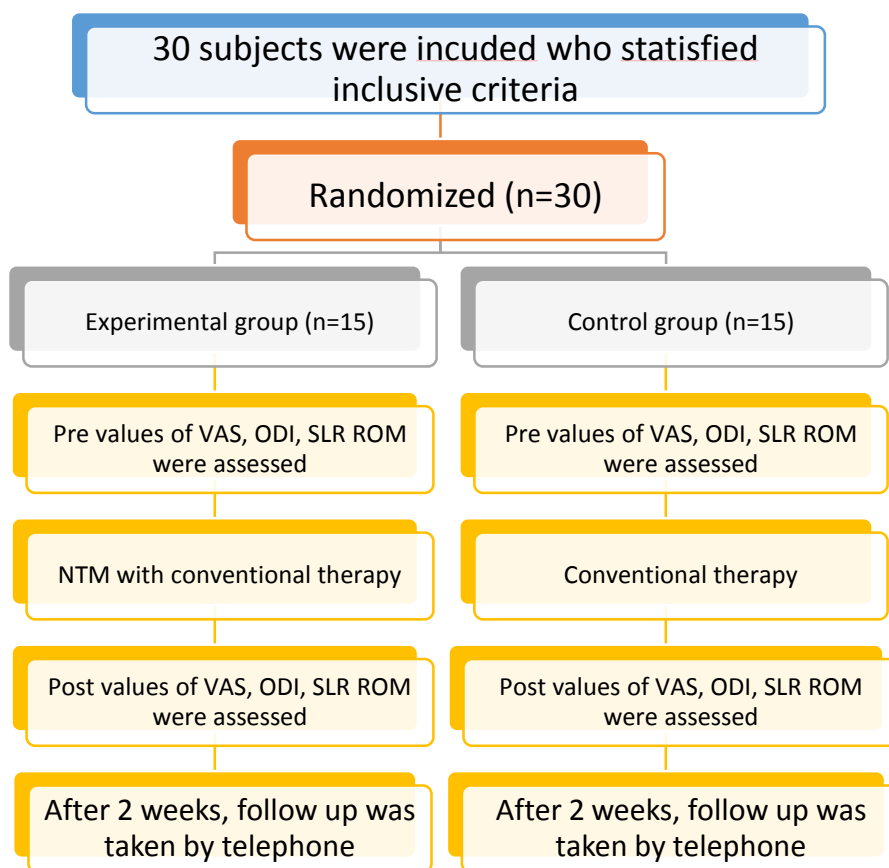
So the aim of to the study is to evaluate the efficacy of neural tissue mobilization on conventional therapy in LBA subjects with Sciatica.

MATERIALS & METHODOLOGY

Materials: The materials used in the study are Intermittent lumbar traction machine, High couch, Chair, Pillows, Foot stepper, Visual analog scale, Oswestry low back pain disability questionnaire, Universal Goniometer.

The primary data was collected from SVIMS College of Physiotherapy, Tirupathi and the study duration was 3weeks. The sample size for the study was 30participants. The study sample included: Pain or paresthesia in lumbar spine with radiating pain on atleast one lower extremity, Age between 30-50 years, Both genders, Subjects with sub-acute, chronic LBA. At least one sign of nerve root compression: Positive ipsilateral or contralateral SLR< 70, Diminished strength of myotome of ipsilateral lower extremity, Diminished lower extremity reflex of symptomatic lower extremity. Subjects associated with any other conditions like Tumours, Metabolic diseases, Rheumatoid arthritis, Osteoporosis, Spinal compression fractures, Prolonged usage of steroids, IVDP were excluded from the study.

STUDY ALGORITHM



PROCEDURE

Prior to the commencement of the procedure, informed written consent was taken from the participants. Only those willing to take intervention for three sessions a week for three weeks were recruited for the study. The thirty (30) subjects were randomly allocated to two groups of fifteen (15) each. Randomization method was used for the purpose of allocation of the subjects to the two groups. All the participants were screened for inclusion and exclusion criteria and then they were requested to participate in the study. Prior to treatment, pre test values for VAS, PASSIVE SLR ROM & OSWESTRY DISABILITY INDEX were measured while performing NTM.

INTERVENTION

Control group:

This group received intermittent lumbar traction, cryotherapy, hamstring stretching, trigger release (where it was required), back strengthening exercises.

Intermittent lumbar traction:

Lumbar traction has traditionally been performed with the patient in supine position with knees and hips flexed to 90 degrees with 1/3rd of the body weight. Prepare the table, including harnesses, pillows, draping sheets, call bell, and timer. Preset treatment time, poundage, time on and off and

duration and angle of pull as per plan of care. Attach traction (pelvic) harness first; the superior part should be in line with the umbilicus. The counter traction (thoracic) harness should then be positioned so that the superior part fits snug around ribs 8, 9, and 10. Attach harness to spreader bar, and remove all slack from the rope. Double-check all settings. Turn on machine and wait for one complete cycle so that all of the slack is taken up; release catch of split table (during off cycle if using intermittent traction) Explain the use of the call bell or safety switch before leaving and ensure that it is within the patient's reach. Treatment duration is for 15 min.⁹

Treatment sessions: Treatment was given 3sessions per week for 3weeks with 30min duration

EXPERIMENTAL GROUP:

The subjects in experimental group were given NTM in addition to conventional therapy.

SCIATIC NERVE MOBILIZATION:

The patient lies supine, relaxed and comfortable on the examination bed, towards the side of the examiner. The trunk and hips should be in a neutral position. The examiner places one hand under the Achilles tendon and the other above the knee. The leg is lifted perpendicular to the bed, with the hand above the knee preventing any knee flexion. The leg was lifted upward, as a solid lever, moving at a fixed point in the hip joint. The straight

leg raise was done for inducing longitudinal tension as the sciatic nerve runs posterior to hip and knee joints. To induce dural motion through the sciatic nerve, the leg was raised past 35 degrees in order to take up slack in the nerve .since the sciatic nerve is completely stretched at 70 degrees, pain beyond that point is usually of hip, sacroiliac, or lumbar spine origin (David, 1997).The unilateral straight leg raise causes traction on the sciatic nerve, lumbosacral nerve roots, and dura mater. Adverse neural tension produces symptoms from the low back area extending into the sciatic nerve distribution of the affected lower limb. To introduce additional traction (i.e., sensitization) into the proximal aspect of the sciatic nerve, hip adduction, medial rotation, dorsiflexion was added to the straight leg raise. Neural mobilization was given for approximately 10min per session including 30 sec hold and 1 min res.^{10,11}

Treatment sessions: Treatment was given 3sessions per week for 3weeks with 40min duration

STATISTICAL ANALYSIS

Statistical analysis was done using soft ware “SPSS 20.0 version”. For this puse the data was entered in to Microsoft excel spread sheet, tabulated & subjected to statistical analysis.

Of the 30 subjects, 15 subjects were randomized in to control group and 15 in to experimental group. All the subjects completed the entire study protocol by 3weeks, as defined. The outcome measures of this study for which statistical analysis was done are VAS, ODI, Pain free SLR ROM. To compare the pre and post treatment with in the groups paired t-test was used and for between the groups independent sample t-test.

ANALYSIS OF COMPARISION BETWEEN EXPERIMENTAL GROUP AND CONTROL GROUP:

Table: 1

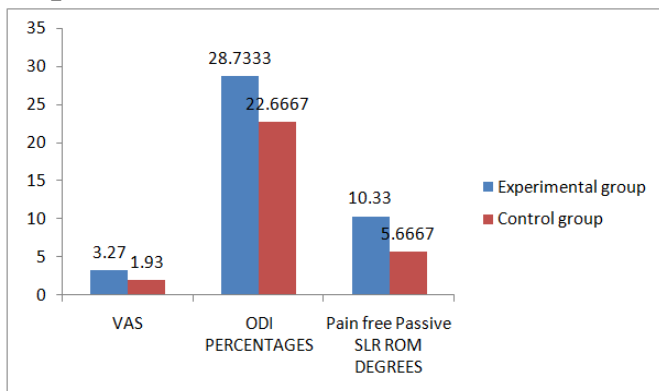
Group	Group	N	Mean	Standard deviation	t-value	p-value
VAS	Control	15	1.93	0.79	3.32	0.003*
	Experiental	15	3.27	1.33		
ODI	Control	15	22.6	4.43	3.02	0.005*
	Experimental	15	28.7	6.39		
PAIN FREE SLR ROM	Control	15	5.66	4.46	2.64	0.015*
	Experimental	15	10.3	6.67		

To test the significance between experimental and control gorups the independent sample t-test has been used. It is observed that there is a highly significant impact on out comes of experimental group than control group.

From the above table we observe that there is a high reduction in VAS score, functional disability along with the improvement in pain free SLR ROM in experimental group when compared control group.

The following graphical representation represents the respective parameters of experimental and control groups.

Graph: 1



RESULTS

The results were found to be statistically significant (p<o.o5) in both control and experimental groups, but there is a high significance in experimental group when compared to control group. Hence neural tissue mobilization have shown its impact on results of experimental group.

DISCUSSION

Based on the statistical analysis, the alternate hypothesis stating that neural tissue mobilization reduces pain, functional disability and improves pain free passive SLR ROM in LBA subjects with sciatica can be accepted and null hypothesis is rejected.

A total number of 30 subjects participated in the study and randomized in to 15 subjects in the experimental group and 15 subjects in the control group. Subjects in the control group received conventional therapy (ILT, hamstring stretching, cryotherapy, back strengthening exercises) where as in experimental group were given Neural tissue mobilization along with conventional therapy.

Experimental group (NTM with conventional therapy) and control group (conventional therapy)

both have shown statistically significant difference between pre and post values of VAS, ODI and pain free passive SLR ROM. But the subjects in the experimental group shown higher significance compared to the control group.

The significant result in the control group explained is due to effect of intermittent lumbar traction and given exercise protocol.

Pain is reduced by intermittent lumbar traction by facilitating relaxation of the paraspinal muscles. It has been proposed that this effect may be result of pain reduction due to reduced pressure on pain sensitive structures or gating of pain transmission by stimulation of sensory mechano receptors by oscillatory movements. It reduces stenosis there by relieving pressure on dura, blood vessels, and nerve roots in the intervertebral foramen. Improving circulation may also help to decrease the concentration of noxious chemical irritants. Separation of the vertebra temporarily increases the size of the intervertebral foramina which decreases pressure on impinged nerve roots.^{12, 13}

Where as in experimental group NTM along with conventional therapy, there is a highly significant improvement in decreasing pain, functional disability with improvement in pain free passive SLR ROM. The underlying cause for this is due to neural flossing effect, that is ability to restore normal mobility and nerve micro circulation as well as influence on axoplasmic and lymphatic flow within the neural tissue.

The nervous system's ability to tolerate tension associated with movement results from an intra neural and extra neural anatomic design.^{14, 15}

Internally, the nerve has designed with undulations of tortuous nature. The nerve's ability to unfold as length increases, was described by CLARK & BEARN. They described that, nerve is able to tolerate elongation through intra neural gliding, between individual nerve fibers and their surrounding endoneurium and the endoneurium surrounding each nerve fiber. The epineurium allows excursion to occur between it and perineurium of each fascicle. Extraneural gliding provides attenuation of tension between perineurium and epineurium. Extraneural gliding or excursion has been demonstrated in the central nervous system and in the peripheral nervous system. Movement of the nerve root is transmitted via the dural sheath and dentate ligaments and not directly to the rootlets.

The results confirm that NTM with conventional therapy provide greater improvement in passive SLR ROM. So, this study adding further evidence

for potential role of neural tissue mechano sensitivity in limiting the SLR. Hence NEURAL TISSUE MOBILIZATION showed significant results in the experimental group.

LIMITATIONS

Study limitations are follow up was taken by subjective analysis through telephone, long term effects have not been evaluated and there is no radiological evidence of nerve mobilization.

RECOMMENDATIONS

Further study is recommended that long term benefits are needed to be evaluated, follow up should be taken by objective analysis, recommended to usage of diagnostic ultrasound which reveal neural mobility.

CONCLUSION

It is concluded from this study that low back ache subjects with sciatica who underwent NTM with conventional therapy showed significant results in reducing pain, functional disability and increase in pain free passive SLR ROM than who underwent only conventional therapy.

Hence, it is concluded that NTM along with conventional therapy as a whole treatment regimen adds up effective results in the treatment of LBA subjects with sciatica.

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