Original Article

Effect of Dry Needling on Patients with Lumbar Radiculopathy in Reducing Pain and Increasing Range of Motion Compared to Interferential Therapy

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Abstract

Background: The most prevalent disorder affecting the spinal cord is lumbar radiculopathy. The incidence of this condition is estimated between 3% and 5% of the population and it impacts both male and female equally. The goal of this present study is to compare the effectiveness of dry needling to interferential therapy [IFT] in terms of reducing pain and increasing the lumbar range of motion in patients with lumbar radiculopathy.

Purpose: To determine the effect of dry needling on patients with lumbar radiculopathy in reducing pain and increasing lumbar ROM compared to interferential therapy.

Materials and Methods: 30 subjects participated and pre assessment and post assessment was taken using Numerical Pain Rating Scale [NPRS] and the Modified-Modified Schober Test [MMST]. For both groups, the intervention period lasted for 2 weeks and the entire study procedure was carried out from November 2022 to April 2023.

Result: This study showed an extremely satisfied statistical significance difference between post-test values of both groups ($p<0.0001$). However, the experimental group showed substantially greater statistical significance than the control group in terms of the decrease in pain levels and the increase in lumber ROM.

Conclusion: The study concluded that intervention provided to the experimental group was more effective than intervention provided to the control group.

Keywords: Lumbar radiculopathy, L4-L5 and L5-S1, nerve root compression, radiating pain, dry needling, IFT.

Introduction

Low back pain that radiates to one or both lower extremities caused by nerve root compression is commonly known as lumbar radiculopathy. In India, lumbar radiculopathy occurs at a rate of 23.9%[1]. Comparatively, only 4 to 6% of the overall population suffers with lumbar radiculopathy. From 6 to 11% of subjects have sciatica symptoms in addition to low back pain. The occurrence of sciatica caused by a disc is 4.4% in the general population.[2]

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The word "lumbar radiculopathy" (LR) refers to a painful condition due to the compression or irritation of the lumbar nerve roots., more especially the L4-L5 and L5-S1 level nerve roots. The pain radiates along the sciatic nerve, which runs from one or both legs down to the low back. Degenerative arthritis, lumbar stenosis, intervertebral disc degeneration or herniation, as well as other ailments such as bone or muscle tumours, infections, or inflammation of the nerve roots, are the main causes of this disease. Signs and symptoms of lumbar radiculopathy depend upon the nerve root affected, most common symptoms such as the low back ache, sharp radiating pain, alterations in the deep tendon reflex, weakness in the muscles, foot numbness, hypersensitivity, tingling and burning sensation in the affected area [3].

The terms radiculopathy and radicular pain are not the same. Only radiating pain is observed in radicular pain, whereas sensory and/or motor loss can be reliably seen in radiculopathy. Radiculopathy could represent a spectrum of radicular pain, and both conditions frequently coexist together [4]. Conventional treatments for lumbar radiating pain include spinal manipulation, physical therapy, myofascial release, exercise as acceptable. Pain relief options include acetaminophen, nonsteroidal anti-inflammatory drugs, muscle relaxants, anti-epileptic drugs (Gabapentin and Pregabalin), membrane stabilizing agents, and narcotics[5]. The use of McKenzie exercises has been proven to produce some immediate clinical improvement in individuals receiving conservative treatment for lumbar radiculopathy[6.] According to some reports, spinal manipulation can improve lumbar radiculopathy patients' pain levels, straight leg raise test results, range of motion, amount of disc herniation, and neurological symptoms [7].

The use of a tiny monofilament needle in acupuncture without the application of an injection is known as "dry needling. Numerous neuromusculoskeletal pain disorders can be treated with dry needling, which is frequently utilized to treat tissues such ligaments, tendons, superficial fascia, tissue with scarring, peripheral nervous system nerves, and nerve bundles. A number of State Boards of Physical Therapy and the National Physical Therapy Association recently narrowed the scope of dry needling to include only "intramuscular" procedures, which involve inserting needles into nodules within taut bands of muscle, also known as "trigger points" (TrPs) or "myofascial trigger points" (MTrPs)[8]. A twitch reaction happens when the muscle being pricked contracts quickly and uncontrollably. The twitch reaction is believed to be the result of a reflex in the spine that follows the mechanical contact the needle provides. The flicker reaction is widely used to determine whether trigger points are present, which often impacts either the patient selection process or the procedure's factors. Studies have indicated that treating trigger points initially can considerably increase the recovery of patients with chronic lumbosacral radiculopathy, and that merely conservative therapy may not be sufficient [9]. Non-functional electrical stimulation (ES) like IFT is a therapeutic approach in which surface electrodes are used to deliver electrical current to neurons in order to promote muscle activity[10]. Individuals with persisting low back aches for a long time may experience a reduction in discomfort, better range of motion, and an improvement in postural stability with an exercise programmed that emphasizes trunk strength, trunk stability, and postural stability[11].

Aim

The aim of this study is to compare the effectiveness of dry needling to interferential therapy in terms of reducing pain and increasing lumbar ROM in patients with lumbar radiculopathy.

Materials and Methods

It was an experimental study conducted on 30 subjects with lumbar radiculopathy, age between 30-50 years was taken and convenient sampling techniques with computer generated random methods were used in the study to allocate the subjects into two groups. The entire study procedure was carried out from November 2022 to April 2023.

Inclusion Criteria

- Age – 30 to 50 years.
- Male and Female patients with lumbar radiculopathy.
- Intervertebral disc herniation.
- Low back ache with radiating pain on leg.
- Positive SLR.
- Positive slump test

Exclusion Criteria

- History of spinal surgery.
- Cancer.
- Fracture in the spine or pelvis.
- Refusal to undergo needle therapy.
- Existence of any red flags for the lumbar spine such as cauda equina.
- History of spinal canal stenosis.
- Pain that scored higher than 8 on the NPRS scale.
- Open wounds, skin diseases and hypersensitivity to metals.

Outcome Measure

Assessment was performed before starting treatment and after weeks of study.

- Numerical Pain Rating Scale [NPRS].
- Modified-Modified Schober Test [MMST].

Procedure

A total of 30 subjects were chosen based on inclusion and exclusion criteria. Informed consent was obtained from the subjects after thorough explanation of the study procedure. The subjects were randomly divided into two groups: experimental group and control group. Experimental group subjects (n=15) received dry needling, interferential therapy and low back exercises and control group subjects (n=15) received interferential therapy and low back exercises. Experimental group subjects received treatment for 2 sessions in a week [2 weeks] and Control group subjects received treatment for 3 sessions in a week [2 weeks].

Intervention Protocols for Experimental Group

The subjects were instructed to lie down in a prone lying position on the examination table and palpated the lower back and pelvic region to identify the most painful trigger points that can be treated with dry needling. The lumbar paraspinal muscles and gluteus medius muscles are the targeted trigger points for dry needling on patients with lumbar radiculopathy**.** A cotton swab dipped in isopropyl solution was used to clean the trigger point area. The procedure was informed to the subjects, and suitable thin, solid filament dry needles with 0.30x60mm were chosen. The needle was carefully inserted into lumbar paraspinal muscles and gluteus medius muscle trigger points or tight bands of muscle known as myofascial trigger points. The surrounding neurovascular structures were protected from harm. Once the needle is inserted, techniques such as gentle movements or fanning method was performed to elicit a localized twitch muscle response. The needle was inserted in the targeted trigger points for 2 minutes. During dry needling, the twitch response was produced in the muscle. Once the desired duration had passed, the needles were removed gently from the subjects. To reduce post-needling pain, subjects were instructed to apply a cold pack for ten minutes twice daily after their treatments. After this procedure, IFT was given to the subjects. The subjects were in prone lying and four electrodes were placed on the painful area of the lumbar region with equidistance that is away from the most painful area. IFT was given to the subjects with the frequency – 100Hz, duration- 15 minutes, Intensity- as per patient tolerance. Dry needling and IFT was given to the subjects for 2 sessions in a week for 2 weeks. After finishing IFT, low back exercises were given to the subjects to strengthen and to increase the lumbar range of motion. Before starting low back exercises, the subjects were provided with an explanation of the purpose and a detailed instruction about low back exercises. Exercises were given to the subjects for 2 days in a week for 2 weeks.

Low Back Exercises

Pelvic Bridge:

The subjects were in supine lying, and hands flat on the floor with the palms facing down. Their feet were flat on the ground, hip-width apart, and their hips and knees were flex to an angle of 90°. Then the subjects were instructed to contract their abdominal muscles and slightly compress their buttocks. Subjects were then told to elevate their pelvis off the ground and tilt it into a "neutral" position without holding their breath.

Protocols:

- Hold for 15 to 20 seconds
- Repeat this exercise for 10 x 3 sets per day.

Back Extension:

The subjects were prone lying, with their hands beneath their shoulders. Inhale and softly squeeze your palms together as you exhale. The subjects were advised to straighten their arms, lift their chest off the ground, maintain their hips firmly planted, and uncurl their buttocks.

Protocols:

- Hold for 15 to 20 seconds at the top
- Back to the starting position by lowering the chest.
- Repeat this exercise for 10 x 3 sets per day.

Cat And Camel:

The subjects were in quadruped position (start on hands and knees). The subjects were instructed to take breath in, then arch their back up to the ceiling as high as comfortable and hold this for a few seconds. Then subjects are asked to breath out and arch their back the opposite direction as low as comfortable.

Protocols:

- Hold for 15 to 20 seconds.
- Repeat this exercise for 10 x 3 sets per day.

Bird – Dog:

The subjects were in a push-up position with their knees on the ground and placed their hands shoulder-width apart with their palms touching the ground. Then they are instructed to extend their right leg backwards with their toes pointed and stretch their left arm forward to keep their hips balanced.

Protocols:

- Hold for 15 to 20 seconds
- Repeat this on the opposite side.
- Repeat this exercise for 10 x 3 sets per day.

Partial Curl – Up:

The subjects were in supine lying with hip and knees flexed and their feet flat on the floor. The participants were asked to cross their arms lightly, tighten their stomach, and rise halfway up while maintaining a shoulder-to-head alignment.

Protocols:

- For 15 -20 seconds, hold this position and uncurl to lie down.
- Repeat this exercise for 10 x 3 sets per day.

Intervention Protocols for Control Group

For the control group, interferential therapy and low back exercises were given to the subjects. Same experimental group, IFT and Low back exercises procedure was followed and was given to control group subjects. IFT and low back exercises were given to the subjects for 3 sessions in a week [2 weeks].

Data Analysis

Pre-test and post-test values of NPRS and MMST are analysed using the paired and unpaired t-test. Paired 't test' were used for analysing the pre and post-test values of individual groups. Whereas, Unpaired 't test' were used to analysis the post-test values of both the groups.

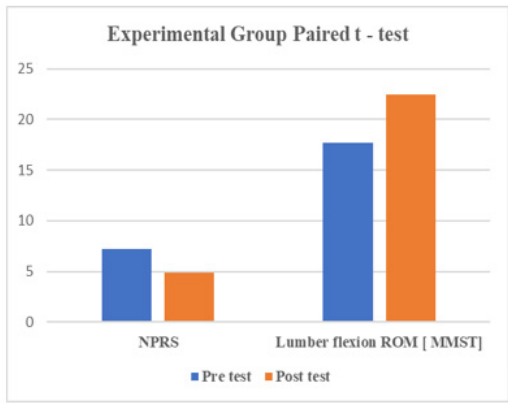

Fig- 1: Comparison between pre and post values of NPRS and MMST in experimental group.

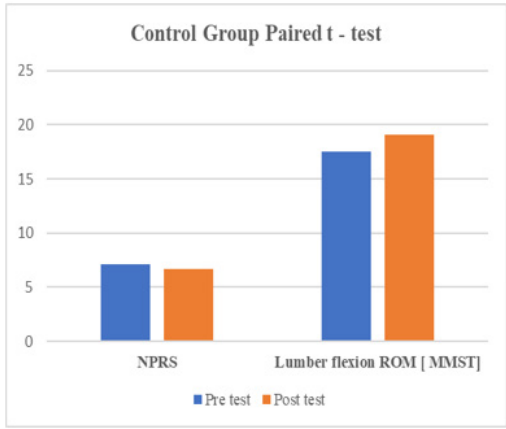

Fig - 2: Comparison between pre and post values of NPRS and MMST in control group.

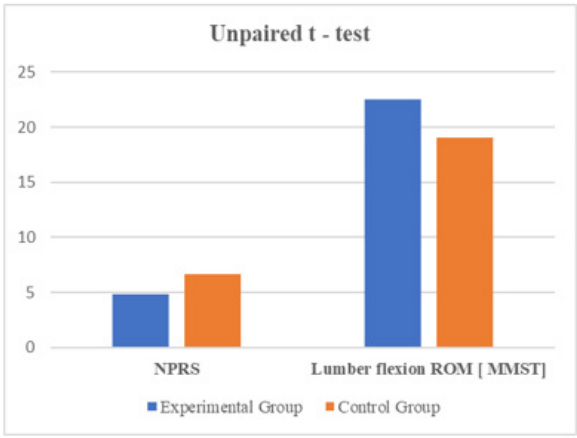

Fig - 3: Comparison between post values of NPRS and MMST in experimental group and control group.

Result

The statistical analysis of pain in experimental group by using NPRS, pre- and post-test values of mean 7.20 ± 4.87and P <0.0001, whereas lumbar flexion ROM in experimental group by using Modified-Modified Schober Test, pre- and post-test values of mean 17.67 ± 22.47 and P<0.0001**[Fig-1]** were statistically significant.

The statistical analysis of pain in control group by using NPRS, pre- and post-test values of mean 7.07 ± 6.67and P<0.0001, whereas lumbar flexion ROM in control group by using Modified-Modified Schober Test, pre- and post-test values of mean 17.47 ± 19.07 and P<0.0001**[Fig-2]** were statistically significant.

The statistical difference between the two groups subjects was evaluated by post values of NPRS and Modified-Modified Schober Test of mean 4.87± 6.67 and 22.47± 19.07; and P value is <0.0001**[Fig-3]** were considered to be extremely statistically significant.

These differences indicated that the subjects receiving dry needling, IFT and low back exercises in the experimental group were highly effective in reducing and increasing ROM compared to the subjects receiving IFT and low back exercises in the control group.

Discussion

This study indicates that there was a significant difference between in reducing pain and increasing lumbar flexion ROM on subjects treated with dry needling, IFT and low back exercises compared to subjects treated with interferential therapy and low back exercises by using Numerical Pain Rating Scale and the Modified-Modified Schober Test. In this study, dry needling technique was effective due to the use of dry needles which releases the trigger points on the muscle so that it helps to reduce pain and improve the functional activity whereas interferential therapy reduce pain but not release the trigger points but it is effective to treat along with dry needling and low back exercises. Low back exercises also play a major role to strengthen back and core muscles. Hence, this study confirms that dry needling, IFT and low back exercises is more effective compared to interferential therapy and low back exercises on patients with lumbar radiculopathy in reducing pain and increasing lumbar flexion ROM.

CE Rainey, et al., stated that dry needling is an invasive technique that activates MTrPs using a monofilament needle. Utilizing trigger point dry needling (TrPDN) with IES intervention to treat lumbar and/or hip stability issues has a significant impact on pain reduction[12].

Gohil, et al., (2021) according to the study's findings, patients with lumbar radiculopathy, which is linked to myofascial trigger points, can get pain relief from the trigger point dry needling approach. Raja MPT, et al., concluded that Visual Analogue Scale (VAS), Modified - modified Schober Test, and Disability scores in the study suggest that back exercise with interferential therapy participants experience much less pain than abdominal strengthening exercise with interferential therapy subjects [9].

Conclusion

The study concluded that intervention provided to the experimental group was more effective in decreasing pain and increasing lumbar flexion ROM than intervention provided to the control group by using NPRS and MMST.

Ethical clearance: This research work has been approved by the ISRB committee. ISRB number - 03/011/2022/ISRB/SR/SCPT.

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Conflict of Interest: No conflict of interest during this research.

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