

# Sciatica: Treatment with a Blend of Maitland Mobilization, McKenzie Exercises along with NMES - A Case Study

Mitisha Shah<sup>1</sup>, Suraj Mathew<sup>2</sup>

<sup>1</sup>Undergraduate, Dr. A.P.J Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences, Loni, Maharashtra, India

<sup>2</sup>Asst. Professor, Dr. A.P.J Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences, Loni, Maharashtra, India

Corresponding Author: Mitisha Shah

## ABSTRACT

Sciatica is referred to radiculopathy involving any of the lower extremity, caused by either inflammation or compression of the nerve roots L1-S1. It can be diagnosed majorly through an appropriate history taking and physical examinations to not be misdiagnosed with other chronic low back pain conditions. A conservative management is preferred when in an acute stage of 6-8 weeks after which a surgical approach is advised. Although various studies have shown evidences that a prolonged conservative care is most fitting than a short term surgical approach (discectomy). The prevalence of sciatic symptoms ranging from 1.6% to 43%, maximum noted in the working population, has drawn attention for the need of an effective and early conservative care to downsize the symptoms causing discomfort and pain. Thus, the aim of the case report was to present with an early and effective conservative care with a blend of Maitland Mobilization, McKenzie exercises along with Neuro-Muscular Electrical Stimulation (Interferential Current) to minimize the discomfort thus easing and bolstering the individual in activities of daily living followed by an uncomplicated returning back to recreational activities. The patient was managed with a blend of Maitland Mobilization, McKenzie exercises and Interferential current for 7 days consecutively along with an individually tailored Home exercise program according the patient tolerance. Outcomes measures namely numerical pain rating scale, lower extremity functional scale and Roland

Morris Disability Questionnaire were evaluated before and after the 7 day intervention period to assess prognosis in pain and pain related disability. Thus the changes in pre and post intervention results stated positive outcomes in reducing pain and improving the functional activity and participation in social and recreational ventures.

**Keywords:** Sciatica, Maitland Mobilization, McKenzie exercise, Interferential Therapy, radicular pain.

## INTRODUCTION

Sciatica is the radiating pain experienced either in unilateral or bilateral lower extremities due to compression or inflammation of the lumbosacral nerve roots (L4-S1) that forms the sciatic nerve with or without associated neurological symptoms like weakness or numbness [1]. It is more persistent and severe than low back pain, having a less favorable outcome thus consuming more health resources [2]. The incidence of sciatica mostly occurs between the third and the fourth decade with an estimated annual incidence of 5 cases per 1000 adults in western countries. It has shown no gender predominance. Genetic predisposition, excessive physical activity and occupation can be a few major causes for sciatic pain [3]. Sciatica has alternatives like radicular pain or lumbosacral radicular syndrome. Lumbar-spine disorders rank

fifth among disease categories in the cost of hospital care and account for higher costs resulting from absenteeism from work and disability than any other category. A major cause of sciatica is herniated disc for which the symptoms should resolve within a period of 6-8 weeks of conservative treatment [4].

The individual would complain of symptoms like Unilateral leg pain more severe than low back pain, Pain most commonly radiating posteriorly at the leg and below the knee, Numbness and/or paresthesia in the involved lower leg, Positive neural tension test with provocation of pain in the affected leg (straight leg raise test/femoral nerve test/slump test), or sometimes Neurological deficit associated with the involved nerve root may be seen. Radicular pain lasting for more than 12 weeks after conservatively managing needs surgical approach which provides relief but as equal relief as that of one year of conservative management [4].

Sciatica has been conservatively managed by various interventions including mobilization, extension biased exercises, electrotherapy modality like low level laser therapy [5], interferential therapy [6], transcutaneous electrical stimulation [7] and others.

This case study focuses on the management of sciatica with a blend of Maitland's mobilization, McKenzie extension biased exercise along with interferential therapy whose combination altogether has been proven to be of great effect in a significantly shorter time span. This study focuses on the individually tailored protocol to avoid the surgical approach and reduce the intensity of pain and ease the activities of daily living that was a hurdle in the routine activities.

## CASE REPORT

A 34-year-old male residing in Shrirampur district of Ahmednagar, IT engineer by occupation, visited Pravara Rural Hospital on 2<sup>nd</sup> march 2021 with a complaint of pain in the low back radiating

to the right lower extremity since past 9 months. Further, he was referred to the department of orthopedic physiotherapy of DR. A.P.J Abdul Kalam College of Physiotherapy for further assessment a management of the same.

He presented with a history of pain in the low back earlier since 8 months while his stay in Pune he started experiencing slight pain in the low back for which he had visited a General Practitioner (GP) in Pune, and was prescribed hifenac mr tablets a type of NSAID. The pain subsided for a while when it reoccurred after a month with increased intensity along with mild tingling in his right lower limb. He visited another GP in Pune where he was suggested an MRI and X-ray and was prescribed another set of analgesics. The MRI findings confirmed a moderate disc bulge at L4-L5 level and the X ray was suggestive of flat back with reduced lordosis and reduced disc space at the L4-L5 and L5-S1 junction of vertebrae. On consulting an orthopedic surgeon in Pune, he was advised for a discectomy for L4-L5 disc bulge with another set of analgesics for temporary pain relief. Later in June on his visit to Srirampur he consulted a physiotherapist with a complaint of aggravated pain in the low back along with increased tingling radiating to the right lower extremity till the second toe. He also complained of difficulty in activities of daily living that included difficulty in walking for more than a km, increased tingling sensation while performing sit to stand after prolonged hours of work and difficulty and discomfort while playing sports like tennis, also defecating difficulties. He was prescribed a set of home exercise program due to covid-19 and was advised to continue the analgesic. He felt mild relief for the timing, when later after a few months the symptoms started aggravating with a greater intensity that was when his elder brother advised him to visit the dept. of orthopedic physiotherapy at Pravara Rural Hospital for further assessment and management.

**On Examination:-** Pain the in low back was gradual in onset since 8-9 months previously, throbbing and tingling in nature radiating from the low back till the right second toe. The pain was rated on numerical pain rating scale 2/10 at rest and 8/10 on movement. Negligible in mornings aggravated till evenings which lead to change in posture and antalgic gait; also indulging in activities like walking more than a km, standing after prolonged hours of sitting, playing tennis, using Indian style toilets or any activity that included forward flexion increased the discomfort. The pain would be relieved by lying flat on the back, and medications helped. According to modified Kuppuswamy scale 2020 he belonged to upper middle class (II) with a score of 23. He confirmed no positive past medical history.

Vitals that are heart rate, blood pressure, respiratory rate were within normal range, presenting with a mesomorph built. On calculation, BMI was normal (21.2 kgm<sup>-2</sup>) with Height and weight being 1.75mts and 65 kgs respectively.

**Local Examination: -**

On inspection it was noted that the patient had an abnormal posture, when laterally assessed found with flat back, obliterated lumbar lordosis and posterior pelvic tilt. Anterior and posterior posture was found normal. Gait was antalgic at the end of day with slight hip hiking on the right due to pain and reduced stance phase and increased swing phase in compensation. On palpation all inspectory findings were confirmed. Spasm was present over the paraspinal muscles around L3-L5 vertebrae along with grade-1 tenderness on the right side of L4-L5 vertebrae. There was moderate tightness seen in bilateral hamstrings. Facet joint restriction was seen in L4-L5 vertebrae.

Range of motion of the lumbar region was significantly reduced in forward flexion and lateral flexion along with mild reduction in extension was observed, when measured with a goniometer. Hip range of motion showed reduced hip flexion and extension in bilateral lower extremity when compared to the normal ranges. Adduction, abduction internal rotation showed no significant changes bilaterally. Bilateral knee and ankle showed normal range of motions with no significant changes.

Joint	Movement	Right (active)	Right (passive)	Left (active)	Left (passive)	Normal ranges
lumbar	Flexion	0- 40				0-60
	Extension	0-19				0-25
	Lateral flexion	0-12	0-13	0-11	0-13	0-25
	Lateral rotation	0-35	0-38	0-27	0-35	0-45
Hip	Flexion	0-80	0-90	0-85	0-100	0-125
	Extension	0-10	0-12	0-15	0-20	0-15
	Abduction	0-45	0-52	0-49	0-58	0-50
	Adduction	0-26	0-30	0-25	0-30	0-30
	Internal rotation	0-30	0-30	0-34	0-35	0-35
	External rotation	0-37	0-40	0-40	0-42	0-45

**Bilateral knee and ankle showed normal range of motions with no significant changes by goniometer.**

Muscle strength testing of individual muscle was performed using oxford method

Muscle	Right	left
Rectus abdominis	normal	normal
Internal oblique	normal	normal
External oblique	normal	Normal
Transverse abdominis	normal	normal
Erector spinae	fair	fair
Multifidus	fair	Fair
iliopsoas	fair	fair

There was no significant limb length discrepancy observed.

Straight leg Raise Test and SLUMP test were positive for the right lower extremity

Functional limitations where increased pain, with reduced ranges in lumbar and hip joints due to tightness and pain, lower abdominals and back extensor muscle strength was graded good, also there

is presence of moderate hamstring tightness in bilateral lower extremity.

Participation in work such as long hours of working at desktop, playing tennis on daily basis, practicing yoga, is restricted due to pain and tingling.

Activities of daily living are limited according to the functional independence measure and lower extremity functional scale.

Outcome measures used were,

1. Lower extremity functional scale
2. Roland Morris scale for pain in the low back [8,9,10]
3. Numerical pain rating scale for pain quantification

### Investigations:

#### MRI dated 12<sup>th</sup> august 2020, stated

Moderate diffuse disc bulge with central, with left paracentral and foraminal disc extrusion noted at L4-L5 level causing compression of L4 exiting and L5 transversing nerve roots on both sides(L>R).

Reduced lumbar lordosis was observed.

Thickened ligamentum flavum at L4-L5 level.

Lumbar bony spinal stenosis noted at L4-L5 levels.

#### X- Ray of lumbar spine AP and lateral dated 6<sup>th</sup> may, 2020 stated

Partially sacralized L5 on the left side.

**Physiotherapy Management:** - The management protocol was set for a period 7 days after which the progression of the patient was re-assessed:

#### Day 1-3:

- The treatment initiated by taking the patient in prone position with pillow supported in 30-35<sup>o</sup> of back extension position, maintained for 15 minutes.
- Maitland's grade 2 and grade 3 posterior-anterior glides were given to the spinous process of L4-L5 vertebrae with a frequency of 2 Hz i.e 120 oscillations/min.

- Similarly grade 2 and grade 3 posterior - anterior glides were given to the facet joints of l4-l5 vertebrae with a frequency of 2 Hz i.e. 120 oscillations/min.

- McKenzie's extension biased exercises were taught to the patient which included :

1. Lying on the stomach with arms at the side, turning the head to the side and holding the position for 2-3 minutes,
2. Lying with pillow under the stomach and pelvis with arms at the side, turning the head to the side holding the position for 2-3 minutes
3. Prone on elbows with a hold of 2-3 minutes (Each exercise with the dosage of 15 reps x 3 sets each)

- Passive static stretching of the hamstrings bilaterally was given with a dosage of 30 seconds hold for 10 repetitions.

- The treatment concluded with interferential therapy with 4 pole linear pattern placement of electrodes along the course of sciatic nerve on the right side, starting with one at the ischia tuberosity, going below the midpoint of popliteal fossa, over the lateral aspect of calcaneus and lastly over the dorsum of the foot at the third metatarsophalangeal joint; with the following characteristics:  
Base of 80 Hz;  
Sweep pattern at 45 Hz;  
Rectangular pulsed form for a duration of 15 minutes.

- Home Exercise Program (HEP) included
  1. Anterior and posterior pelvic tilts in crooks lying position – facilitates the pelvic motion
  2. Pelvic rotations on either side – facilitates pelvic mobility
  3. McKenzie extension biased exercises  
(Each exercise should be performed for 10 repetitions x 3 sets)

#### Day 4 -7:

- The treatment initiated by taking the patient in prone position with pillow



supported in 30-35° of back extension position, for 15 minutes.

- Maitland grade 3 & 4 postero- anterior glides were given to the spinous process of L4-L5 vertebrae with a frequency of 2 Hz i.e. 120 oscillations/min.
- Similarly grade 3-4 postero- anterior glides were given to the facet joint of L4-L5 vertebrae with a frequency of 2 Hz i.e. 120 oscillations/min.
- McKenzie’s extension biased exercises were taught to the patient as progression which included:
  1. Continuing with all the exercise prescribed from day 1- day 3
  2. Prone press-ups, straightening the arms while prone on elbows to lift the upper body holding the position for 2 seconds and return
  3. Standing extension exercise, placing the hands on the back, perform extension holding the position for 2 seconds and return to normal position  
(Dosage of 10 reps x 3 sets each)
- Passive stretching of the hamstrings bilaterally was given with a dosage of 30 seconds x 10 reps as previously.
- The treatment concluded with interferential current therapy same as earlier with progression in intensity depending on the patient’s response and tolerance.
- Home exercise program prescribed was progressed depending upon the patient tolerance and response. HME was prescribed to be performed twice a day scheduled with a 6-8 hr interval.



Figure 1: Maitland mobilization at L4-L5 segment with a postero-anterior glide.



Figure 2: Maintained prone position at 30-35°



Image 3: Mckenzie extension biased exercise positions maintained for 2-3 minutes

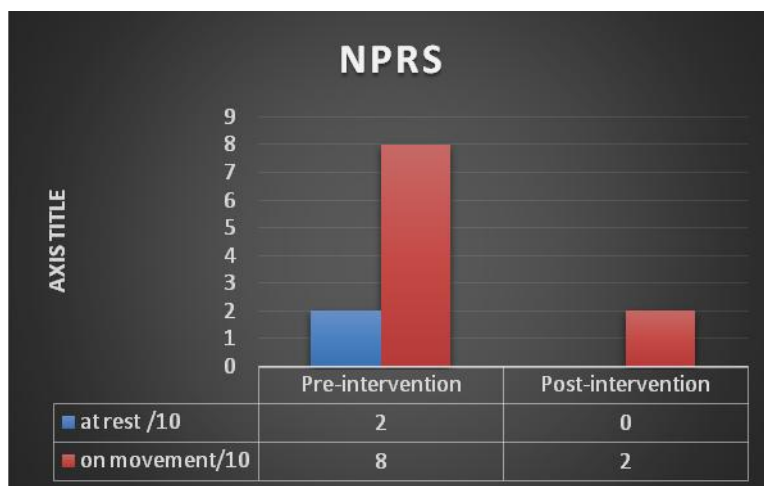
## RESULT

Table 1: shows the result obtained before and after the 7 days intervention on the NPRS

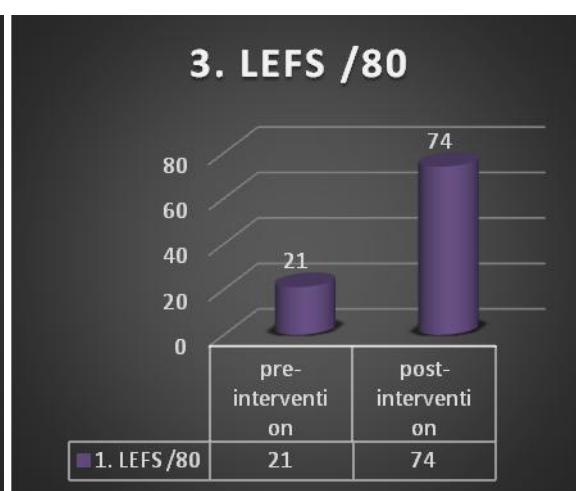
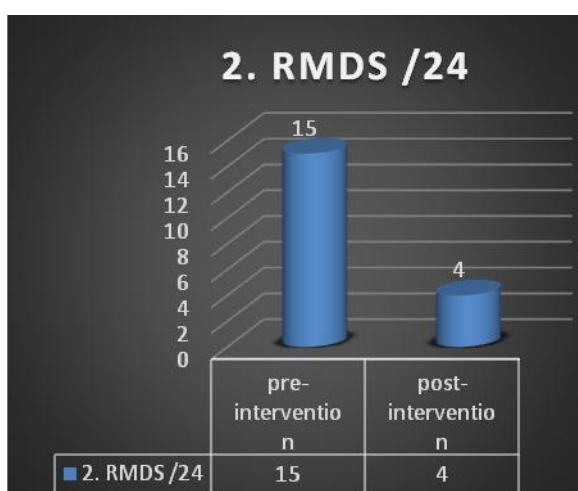
Numerical pain rating scale (NPRS)	Pre-intervention	Post-intervention
At rest	2/10	0/10
At movement	8/10	2/10

Table 2: shows the result obtained before and after the 7 days intervention on the LEFS and RMS.

Outcome measures	Pre-intervention	Post-intervention
Lower extremity functional scale /80	21	74
Roland Morris Disability scale /24	15	4



Graph 1: shows the statistical presentation of the pre and post intervention scores on the numerical pain rating scale at rest and at movement.



Graph 2 & 3: shows the statistical presentation of the pre and post intervention scores on the RMDS and LEFS.

## DISCUSSION

Sciatica has been treated with various conservative methods before attempting a surgical approach. A combination of physical therapy along with medical management has been more effective than a single treatment alone. In this study we have used, a blend of Maitland mobilization, McKenzie exercise along with NMES technique. Mobilization along with oscillatory movement help to improve the range of motion of the hypo-mobile vertebrae and reduce sensitivity of the neural structures that cause irritation while movement. They also result in increasing the fiber glide and break adhesions which in turn restore the normal mobility. Posterior anterior glide restores the normal lordosis hence relaxing the muscle by reducing the muscle activity. It acts on the mechanical

interface of the L4-L5 segments thus reducing the neural compression. All these physiological changes in summation lead to reduction in pain and increasing range of motion [11]. McKenzie exercises are known to show effect on the basis of centralization phenomenon of pain which is seen in the initial stages of assessment associated with a desirable response and change in pain intensity and location. This in turn guides the therapist towards an appropriate exercise and formulation of other manual therapy techniques. It works on the mechanical, cognitive and sensory perception of pain that ultimately leads to modified pain and thus correction of functional disabilities. This centralization phenomenon has projected to have positive outcomes and faster return to work. The main aim of including McKenzie exercises in this study

was pain relief centrally. It has shown effects in improving the flexibility of spine along with pain relief. It unloads excessive pressure on the spine, restores the normal curvature of the spine providing appropriate support to the lower back. McKenzie has been clinically and evidently effective in the management of persistent chronic low back pain in individuals with centralization phenomenon [12]. In a study by Petersen, McKenzie method was found to be more effective than spinal manipulation in individuals that present with centralization or peripheralisation symptoms for persistent low back pain [13]. This study also includes the neuro-muscular electrical stimulation (NMES) technique which included interferential therapy (IFT) which works on several physiological effects such as gate control theory, increased circulation, descending pain suppression, block of nerve conduction, and placebo. The capacity of interferential currents (IFC) to reduce the impedance offered by the skin makes it an advantage over any other low-frequency current. Interferential therapy along with other co-intervention has proven to be more effective than IFC alone in early (as a control) as well as long term period (using the placebo effect) for reducing chronic musculoskeletal pain [14].

A study by Sharma et al, has evidently proven that L4 mobilization along with posterior pelvic tilting exercise has a significant effect in improving back and sciatica pain [8]. Also, another study by Manuel Albornoz-Cabello et al has shown evidence of significant reduction in chronic low back pain with the help of interferential therapy [15].

The current study has proven to show significant results in reduction of sciatic pain radiating to the lower limb by showing reduction in the NPRS scores during both rest and movement after the 7 week intervention. The lower limb function also showed positive and improved scores when measured by the lower extremity functional scale. Since the pain radiated right below till the second toe, the patient

had difficulty in performing lower extremity activities with ease. Higher scores indicate high functions of the lower extremity. Also Roland-Morris Low Back Pain and Disability Questionnaire (RMQ) scale which was used to interpret the disability level. It showed significant reduction in the post-intervention scores as compared to the pre-intervention scores with a 60% improvement in the disability. The patient also stated improvement in activities of daily living as compared to earlier.

## CONCLUSION

On the basis of the current data and results, it can be evidently concluded that a combination of Maitland Mobilization, McKenzie extension biased exercises along with IFT placed along the course of sciatica pain shows significant reduction in pain and irritation and improves the quality of life and activities of daily living are eased.

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## REFERENCES

1. Peul WC, van Houwelingen HC, van den Hout WB, Brand R, Eekhof JA, Tans JT, Thomeer RT, Koes BW; Leiden-The Hague Spine Intervention Prognostic Study Group. Surgery versus prolonged conservative treatment for sciatica. *N Engl J Med.* 2007 May 31;356(22):2245-56. doi: 10.1056/NEJMoa064039. PMID: 17538084.
2. Konstantinou, Kika & Dunn, Kate. (2008). *Sciatica: Review of Epidemiological Studies and Prevalence Estimates.* *Spine.* 33. 2464-72. 10.1097/BRS.0b013e318183a4a2.
3. Davis D, Maini K, Vasudevan A. *Sciatica.* [Updated 2021 Feb 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-.

4. Koes BW, van Tulder MW, Peul WC. Diagnosis and treatment of sciatica. *BMJ*. 2007 Jun 23;334(7607):1313-7. doi: 10.1136/bmj.39223.428495.BE. PMID: 17585160; PMCID: PMC1895638.
5. Mashhoudi Barez M, Tajziehchi M, Heidari MH, Bushehri A, Moayer F, Mansouri N, Safavi Naini N, Movafagh A. Stimulation Effect of Low Level Laser Therapy on Sciatic Nerve Regeneration in Rat. *J Lasers Med Sci*. 2017 Summer;8(Suppl 1):S32-S37. doi: 10.15171/jlms.2017.s7. Epub 2017 Aug 29. PMID: 29071033; PMCID: PMC5642176.
6. Olawale, Olajide & Agudzeamegah, CM. (2014). The efficacy of interferential therapy and exercise therapy in the treatment of low back pain. *Nigerian Journal of Experimental and Clinical Biosciences*. 2. 10. 10.4103/2348-0149.135610.
7. Okonkwo UP, Ibeneme SC, Ihegihu EY, Egwuonwu AV, Ezema IC, Maruf AF, Okoye EC, Ibikunle OP, Ezeukwu AO. Effects of transcutaneous electrical nerve stimulation in the Management of Post-Injection Sciatic Pain in a non-randomized controlled clinical trial in Nnewi, Nigeria. *BMC Complement Altern Med*. 2018 Nov 26;18(1):310. doi: 10.1186/s12906-018-2373-8. Erratum in: *BMC Complement Altern Med*. 2019 Jan 8;19(1):12. PMID: 30477485; PMCID: PMC6258320.
8. KIM M., GUILFOYLE M., SEELEY H. and LAING R.: A modified Roland-Morris disability scale for the assessment of sciatica. *Acta. Neurochir.*, 152: 1549-1553, 2010.
9. SENSKE J. and HARRIS M.: Initial validation of a modified version of the Roland-Morris Disability Questionnaire (RMDQ) in a general chronic pain population. *The Journal of Pain*, 14 (4), 2013.
10. STEVENS M., LIN C. and MAHER G.: The Roland Morris Disability Questionnaire. *Journal of physiotherapy*, 62 (2): 116, 2016.
11. Ph.D., DINA & Ph.D., SANDRA. (2020). Effect of L4 Mobilization and Posterior Pelvic Tilting Exercise on Sciatica in Patients with Spondylolisthesis. *The Medical Journal of Cairo University*. 88. 2045-2050. 10.21608/mjcu.2020.125148.
12. Al-Obaidi SM, Al-Sayegh NA, Nakhi HB, Skaria N. Effectiveness of Mckenzie intervention in chronic low back pain: a comparison based on the centralization phenomenon utilizing selected bio-behavioral and physical measures. *Int J Phys Med Rehabil*. 2013;1(128):2.
13. Petersen, Tom; Larsen, Kristian; Nordsteen, Jan DC; Olsen, Steen; Fournier, Gilles; Jacobsen, Soren. The McKenzie Method Compared With Manipulation When Used Adjunctive to Information and Advice in Low Back Pain Patients Presenting With Centralization or Peripheralization, *Spine*: November 15, 2011 - Volume 36 - Issue 24 - p 1999-2010 doi: 10.1097/BRS.0b013e318201ee8e
14. Fuentes JP, Armijo Olivo S, Magee DJ, Gross DP. Effectiveness of interferential current therapy in the management of musculoskeletal pain: a systematic review and meta-analysis. *Phys Ther*. 2010 Sep;90(9):1219-38. doi: 10.2522/ptj.20090335. Epub 2010 Jul 22. PMID: 20651012.
15. Albornoz-Cabello M, Maya-Martín J, Domínguez-Maldonado G, Espejo-Antúnez L, Heredia-Rizo AM. Effect of interferential current therapy on pain perception and disability level in subjects with chronic low back pain: a randomized controlled trial. *Clin Rehabil*. 2017 Feb;31(2):242-249. doi: 10.1177/0269215516639653. Epub 2016 Jul 10. PMID: 26975312.

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